

TC-10022-04

3.2
12/98

BILDF

FINAL SITE INSPECTION REPORT BRADFORD ISLAND LANDFILL CASCADE LOCKS, OREGON

Contract No. DACW57-96-D-0009
Task Order 10

Prepared for



**U.S. Army Corps of Engineers
Portland District**
333 Southwest First Avenue
P.O. Box 2946
Portland OR 97208-2946

December 1998

Prepared by



Tetra Tech
One Union Square
600 University Street, Suite 800
Seattle, Washington 98101

USEPA SF



1269137

TETRA TECH

TC-10022-04

FINAL SITE INSPECTION REPORT BRADFORD ISLAND LANDFILL CASCADE LOCKS, OREGON

Contract No. DACW57-96-D-0009
Task Order 10

Prepared for



U.S. Army Corps of Engineers
Portland District
333 Southwest First Avenue
P.O. Box 2946
Portland OR 97208-2946

December 1998

Prepared by



Tetra Tech
One Union Square
600 University Street, Suite 800
Seattle, Washington 98101

CONTENTS

	<u>Page</u>
LIST OF FIGURES	iii
LIST OF TABLES	iv
SECTION 1.0 INTRODUCTION	1
SECTION 2.0 PROJECT DESCRIPTION	2
2.1 PHYSIOGRAPHY	5
2.2 GEOLOGY AND HYDROLOGY	5
2.2.1 Bedrock and Significant Rock Units	5
2.2.2 Overburden	9
2.2.3 Hydrologic Model	11
2.3 SITE HISTORY	12
2.4 PREVIOUS INVESTIGATIONS	14
2.5 CONCEPTUAL SITE MODEL	17
SECTION 3.0 SCOPE AND TECHNICAL APPROACH	19
3.1 OBJECTIVES	19
3.2 INVESTIGATION ACTIVITIES	20
3.3 SAMPLE ANALYTICAL PROGRAM	23
3.3.1 Analytical Methods	25
3.3.2 Field Quality Assurance/Quality Control Sampling	26
3.4 INVESTIGATION AND SAMPLING METHODOLOGIES	26
3.4.1 Sediment Sampling	26
3.4.2 Groundwater Seep Surveying	27
3.4.3 Soil Sample Collection	27
3.4.4 Groundwater Monitoring Well Construction	30
3.4.5 Groundwater Monitoring Well Development	31
3.4.6 Groundwater Sample Collection	31
3.4.7 Quality Control Sample Collection	32
3.5 EQUIPMENT DECONTAMINATION	33
3.6 INVESTIGATION DERIVED WASTE	34
SECTION 4.0 INVESTIGATION RESULTS	36
4.1 SITE HYDROGEOLOGY	36

4.2 INVESTIGATION ACTIVITIES SUMMARY	37
4.2.1 Magnetometer Survey	37
4.2.2 Soil Boring and Monitoring Well Installation	37
4.2.3 Surface Soil Sampling	39
4.2.4 Test Pit Excavation and Sampling	39
4.2.5 Groundwater Sample Collection	40
4.2.6 Seep Survey and Sediment Sampling	41
4.3 SAMPLE ANALYTICAL RESULTS.....	42
4.3.1 Surface Soil Samples	43
4.3.2 Subsoil Samples	52
4.3.3 Asbestos Samples	55
4.3.4 Groundwater Samples.....	56
4.4 LANDFILL VOLUME ESTIMATE	65
4.5 DATA QUALITY ASSURANCE/QUALITY CONTROL EVALUATION	65
4.5.1 Field Duplicate Samples.....	65
4.5.2 Trip Blank Sample.....	66
SECTION 5.0 SUMMARY AND CONCLUSIONS	67
5.1 PROJECT BACKGROUND	67
5.2 PESTICIDE MIXING AREA.....	68
5.3 LANDFILL SITE	69
5.4 COLUMBIA RIVER	70
5.5 CONCLUSIONS AND RECOMMENDATIONS	71
SECTION 6.0 REFERENCES	73

APPENDICES

APPENDIX A. PERSONNEL INTERVIEWS AND AERIAL PHOTOGRAPH REVIEW
APPENDIX B. CORPS OF ENGINEERS DRILLING LOGS
APPENDIX C. PHOTO LOG
APPENDIX D. LAND SURVEY RESULTS
APPENDIX E. FIELD BORING LOGS
APPENDIX F. TEST PIT AND FIELD SAMPLING LOGS
APPENDIX G. GROUNDWATER WELL CONSTRUCTION, DEVELOPMENT, AND SAMPLING LOGS
APPENDIX H. LABORATORY ANALYTICAL REPORT
APPENDIX I. DATA QUALITY EVALUATION REPORT
APPENDIX J. LANDFILL VOLUME ESTIMATES

LIST OF FIGURES

<u>Number</u>		<u>Page</u>
1	Site Location Map, Bradford Island Landfill Site, Cascade Locks, Oregon	3
2	Site Plan, Bradford Island Landfill, Cascade Locks, Oregon	4
3	U.S. Army Corps of Engineers Topography and Piezometer Location Map, Bradford Island Landfill Site, Cascade Locks, Oregon	6
4	Conceptual Site Model, Bradford Island Landfill, Cascade Locks, Oregon	18
5	U.S. Army Corps of Engineers Sample Location Map, Bradford Island Landfill Site, Cascade Locks, Oregon	21

LIST OF TABLES

<u>Number</u>		<u>Page</u>
1	Groundwater Elevations in Feet Above MSL Associated with the U.S. Army Corps of Engineers Piezometers Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon.....	15
2	Sample Analytical Summary, Site Inspection Bradford Island Landfill, Cascade Locks, Oregon	24
3	Total Metals in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	45
4	SPLP Metals in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	46
5	Volatile Organic Compounds in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	47
6	Semi-Volatile Organic Compounds in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	48
7	Organochlorine Pesticide and PCB Analytes in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	49
8	Herbicide Analytes in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	50
9	Petroleum Hydrocarbons in Soil Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	51
10	Volatile Organic Compounds in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	57
11	Semi-Volatile Organic Compounds in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	58
12	Pesticides in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	59
13	Polychlorinated Biphenyls in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	60

14	Herbicides in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	61
15	Metals in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	62
16	Petroleum Hydrocarbons in Groundwater Samples, Site Inspection, Bradford Island Landfill, Cascade Locks, Oregon	63

SECTION 1.0 INTRODUCTION

Pursuant to the requirements of Contract DACW57-96-D-0009, Task Order 10, the U.S. Army Corps of Engineers Portland District (CENWP) requested that engineering services be provided by Tetra Tech, Inc. to conduct a site inspection of the abandoned Bradford Island landfill, located at the Bonneville Lock and Dam Project in Cascade Locks, Hood River County, Oregon. The purpose of the site inspection was to determine if historical disposal practices at the landfill had adversely impacted the environment and, if so, to determine if removal or other remedial actions would be necessary, or if further investigation is required.

Site inspection activities at the Bradford Island landfill site included collection of surface soil, subsoil, and groundwater samples. Samples collected during the site inspection were obtained from test pits excavated using a backhoe, and from borings and groundwater monitoring wells installed using hollow stem auger drilling techniques. An attempt was also made to collect sediment samples from the Columbia River adjacent to the landfill site. However, no sediment was present in the areas identified for sample collection during repeated sampling attempts. A visual survey for the presence of groundwater seeps on the steep shoreline adjacent to the landfill site was also performed during the site inspection field investigation.

This site inspection report has been prepared to summarize the field activities conducted at the site during August and September 1998, and to document the results of the associated soil and groundwater sampling and analytical program. This document includes a comparison of the analytical results obtained with selected risk-based screening levels, and with the applicable or relevant and appropriate requirements (ARARs) that have been preliminarily identified for the site.

SECTION 2.0 PROJECT DESCRIPTION

Bradford Island is part of the Bonneville Lock and Dam Project, within the Columbia River which forms the border between the states of Oregon and Washington in the project area (Figure 1). The landfill site is in the northeast corner of Bradford Island and is located within the State of Oregon. The site is within the southwest quadrant of Section 22, Township 2 North, Range 7 East, Willamette Meridian; and is not currently used as a part of the routine operation of the Bonneville Lock and Dam. Based on historical information available regarding disposal activities at the site, four main areas of concern have been identified (Stampe 1996; see Figure 2). These areas of concern include:

- A concrete pad on the southern edge of the landfill site that was used as a pesticide mixing area and to rinse articles containing pesticides;
- A number of trash pits located within the landfill site that are believed to have been filled with mercury vapor lamps, oil and grease from the dam turbines, grease from the wicket and spill gates, and paint-related wastes including solvents;
- The sediments adjacent to the bank of the Columbia River east of the landfill site that was reportedly used for storage and disposal of 5-gallon buckets of spillway gate grease, switch gear, and various cables;
- The sediments adjacent to the bank of the Columbia River north of the landfill site where scrap metal including pipes with lead-based paint, pneumatic and hydraulic equipment, and insulators that possibly held residual polychlorinated biphenyl (PCB) -containing oil were reportedly disposed.

The following sections summarize the physiography, geology and hydrology, site history, and previous investigations associated with the landfill site. The discussions regarding site physiography, geology, and hydrology have been developed by the CENWP (COE 1998).

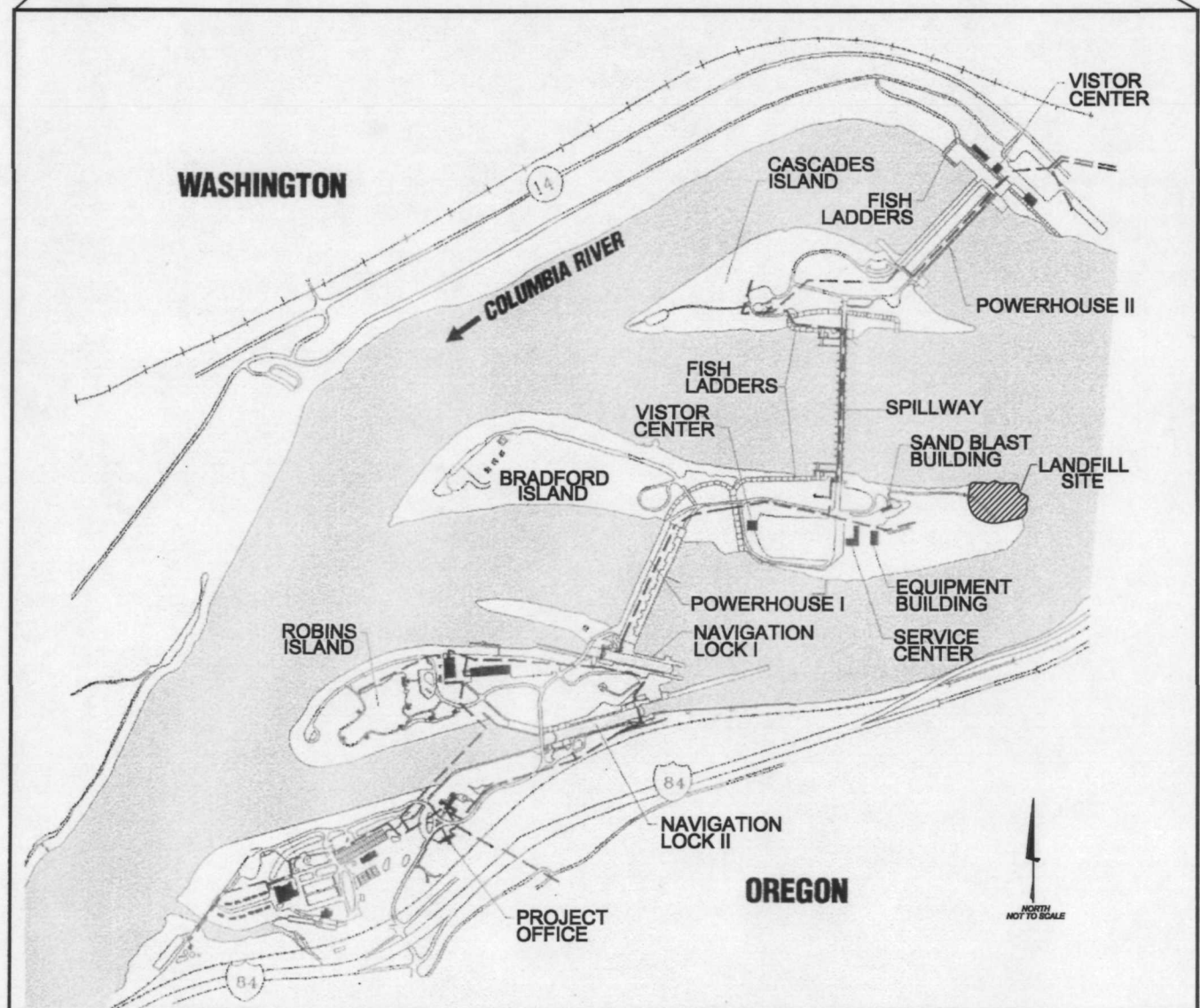
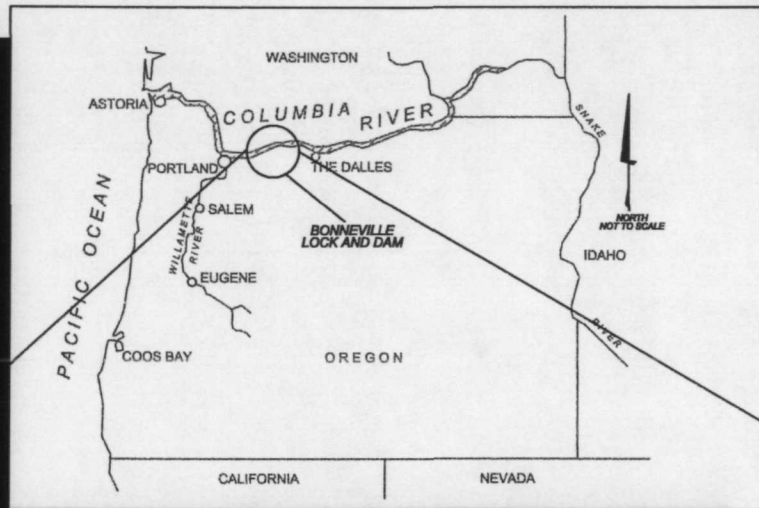
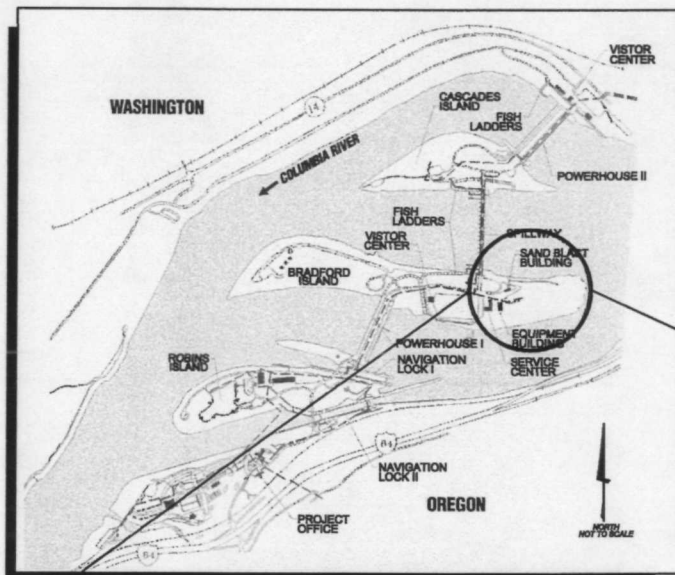


FIGURE 1

SITE LOCATION MAP. BRADFORD ISLAND
LANDFILL SITE, CASCADE LOCKS, OREGON



LEGEND	
	PESTICIDE MIXING AREA
	DISPOSAL PITS
	NORTH BANK MIXED WASTE DISPOSAL AREA
	EAST BANK MIXED WASTE DISPOSAL AREA

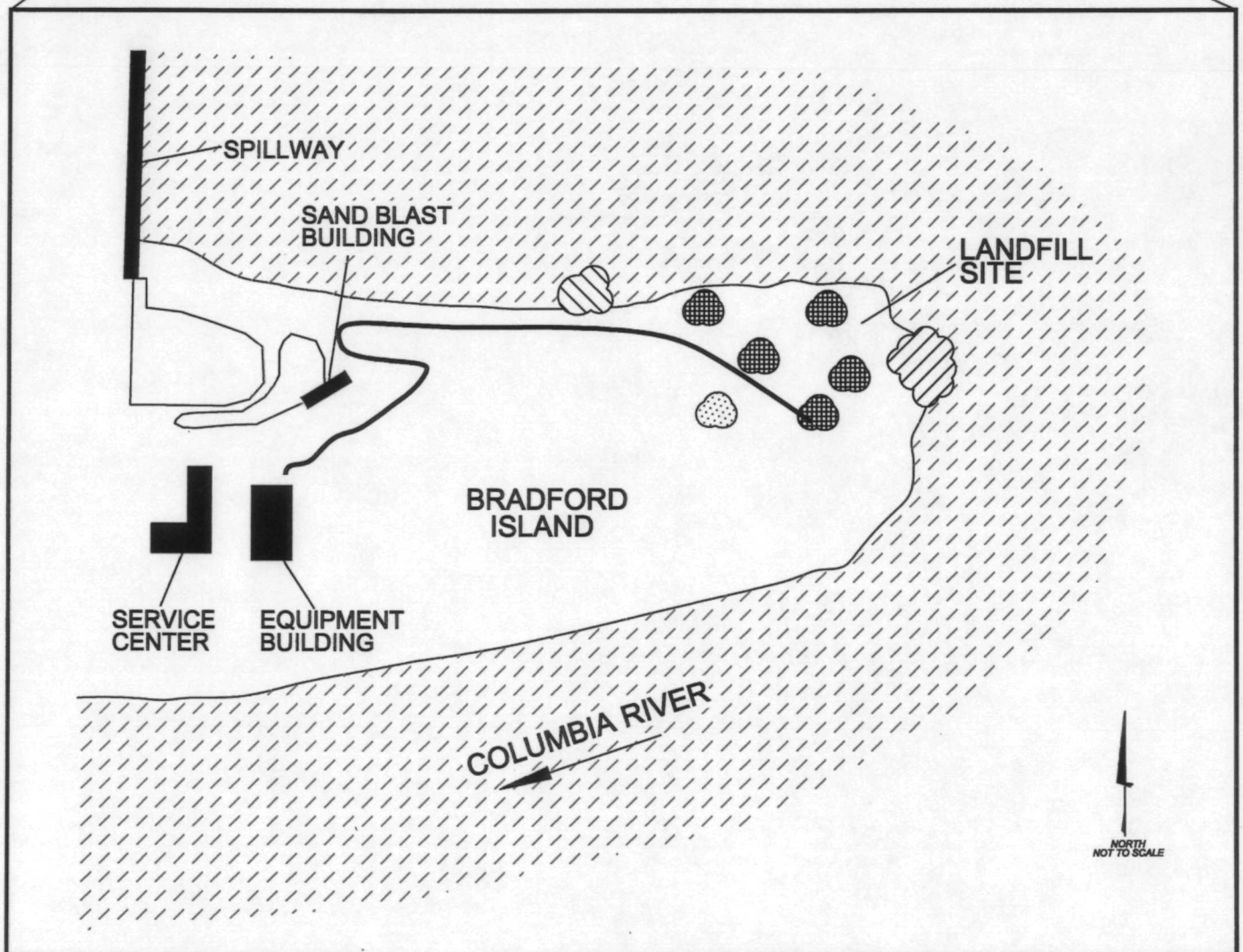


FIGURE 2

SITE PLAN, BRADFORD ISLAND
LANDFILL SITE, CASCADE LOCKS, OREGON

2.1 PHYSIOGRAPHY

The former landfill site is located on Bradford Island within the Columbia River. The site is located near the northeast (upstream) corner of the island and is within 100 feet of the Bonneville Pool (Figure 3). The ground surface of the landfill site is rather flat at an approximate elevation of 110 feet above mean sea level (msl), with a slight slope toward Bonneville Pool (minimum elevation 70 feet msl). Toward the pool on the east and north sides of the landfill site, the ground surface becomes steep and drops rather abruptly to below pool level. To the south and southwest the ground surface rises moderately to steeply toward the center of the island. Surface runoff from this area tends to run into the landfill site.

2.2 GEOLOGY AND HYDROLOGY

Bradford Island consists of a heterogeneous assemblage of alluvial and land slide materials that have been deposited in a deep bedrock channel within the Columbia River. Bedrock beneath the island is generally deeper than elevation minus 100 feet msl. Much of the east end of the island, where the landfill is located, is underlain by a single or several very large slide blocks of Eagle Creek Formation materials. The slide blocks are part of the Tooth Rock Landslide located adjacent to the area on the Oregon side of the river.

2.2.1 Bedrock and Significant Rock Units

Bedrock beneath the land fill site consists of stratified volcanoclastic rocks, informally referred to by the COE as the Weigle formation. In geologic literature, the Weigle formation is considered to be part of the Ohanapecosh Formation, and more recently part of the Stevens Ridge Formation. The Weigle formation was originally defined and divided from the Eagle Creek Formation in 1960. Before 1960, the Weigle formation was included within the Eagle Creek Formation. The Eagle Creek Formation described by Holdredge (Holdredge 1937), includes both the present day Eagle Creek Formation and the informal Weigle formation.

Figure 3

**U.S. Army Corps of Engineers
Topography and Piezometer Location Map**

**Bradford Island Landfill Site
Cascade Locks, Oregon**

1200 SIXTH AVENUE
SEATTLE, WA 98101

This is due to the Original being:

Other:

Document Information

Bradford Island Landfill (BILDF)

Figure 3

Significant bedrock units within the Bonneville Project area include: 1) the Weigle formation which is the oldest and stratigraphically the lowest unit exposed in the Columbia River Gorge; 2) the Eagle Creek Formation which unconformably overlies the Weigle formation; and 3) the Columbia River Basalt Group which disconformably overlies the Eagle Creek Formation. Only the Weigle formation makes up the bedrock beneath the site. The other units are significant in forming large slide blocks and slide debris within the overburden beneath Bradford Island.

2.2.1.1 Weigle Formation. The Weigle formation makes up the bedrock beneath the landfill site. The Weigle formation also makes up the foundation rock for the spillway dam and second powerhouse and has been traced across the valley floor in exploratory bore holes. The Weigle formation is late Oligocene in age and consists of locally derived volcanoclastic materials which have been subaqueously deposited. Approximately 2/3 of the clastic materials which make up this formation were originally deposited as fine grained volcanic glass. The remaining 1/3 of the clastic materials were predominantly larger sized lithic fragments. The lithology of the Weigle formation consists of interbedded mudstones (that make up the bulk of the formation), siltstones, sandstones, and minor conglomerates.

Stratification within the Weigle formation is extremely varied and discontinuous. Bedding thickness can range from less than 0.1 inch to greater than 20 feet. Individual beds generally cannot be traced laterally more than a few hundred feet. Bedding contacts are variable, ranging from sharp and planar to gradational and indistinct.

The Weigle formation is considerably altered. This alteration is manifested by the devitrification of volcanic glass. The volcanic glass which originally made up the bulk of the fine grain size fraction of the rock has been completely altered to a dominantly clay mineral assemblage. The alteration of the Weigle formation makes it very susceptible to slaking. This alteration has also made the Weigle formation relatively impermeable. The upper foot of so of the Weigle formation is generally altered to a high plasticity clayey silt [Unified Soil Classification System (USCS) designation MH] to a low to medium plasticity clay (USCS designation CL) that tends to form a water tight rind. Moreover, faults and shear zones within the Weigle formation have generally produced clay gouge zones that render these discontinuities nearly impermeable.

The Weigle formation has been significantly disturbed. This disturbance is manifested by folding and faulting. Bedding strikes generally trend to the northeast and north, and dip from 5 to 20 degrees to the southeast and east. Faults and shear zones observed in the foundation of the second powerhouse generally follow two trends: 1) strike to the northwest and dip moderately to steeply to the northeast; and 2) strike to the northeast and dip gently to moderately to the northwest. Up to 20 feet of displacement has been noted on the faults. The disturbance noted in the Weigle formation does not continue into the overlying Eagle Creek Formation implying that the disturbance occurred before the deposition of the Eagle Creek Formation.

Within landslide deposits, Weigle formation materials can form blocks and slide debris. Weigle slide debris generally consists of soft to dense plastic matrix material that is impermeable. Lithic clasts from the Weigle formation or other formations can be included. The basal zone of the Tooth Rock Landslide consists of an approximately 60-foot thick zone of sheared Weigle formation. This material is generally dense and impermeable.

2.2.1.2 Eagle Creek Formation. The Eagle Creek Formation unconformably overlies the Weigle formation, and is exposed on the Columbia River Gorge walls above the river level. The Eagle Creek Formation is present only on the Gorge walls and not across the valley floor of the Gorge. This rock unit is significant to the site because large detached blocks and debris of Eagle Creek Formation materials are present in the landslide deposits that underlie Bradford Island. In 1961 and 1970, the Eagle Creek Formation was redefined to distinguish it from the underlying Weigle formation. The Eagle Creek Formation is a series of "volcanic conglomerates, sandstones and tuffs". The major distinctions between this formation and the Weigle are the coarser grain size, and the lack of alteration and disturbance. Volcanic glass that makes up a significant constituent of the Eagle Creek Formation remains relatively fresh and unaltered. Bedding dips are generally near horizontal, and no significant faulting or discontinuities are present. Most of the rock types are volcanic conglomerates which contain angular boulder and cobble-size rock fragments in a matrix-supported groundmass of fine gravel to coarse sand size pumice and/or scoria. True ortho-conglomerates and sandstones are present in lesser amounts. Fine-grained rock types which make up the bulk of the Weigle formation are rare in the Eagle Creek Formation.

Within landslide deposits Eagle Creek Formation materials form slide blocks and slide debris. Slide debris of Eagle Creek Formation generally has a granulated non plastic matrix that is somewhat permeable. Slide debris zones between slide blocks can be connected hydraulically to adjacent aquifers. Water levels within these zones will generally be higher than that of the adjacent aquifers implying limited permeability along these features.

2.2.1.3 Columbia River Basalt Group. The Columbia River Basalt Group disconformably overlies the Eagle Creek Formation. The Columbia River Basalts form the prominent cliffs within the Columbia River Gorge. This unit makes up bedrock only on the Gorge walls and not across the valley floor. However, large slide blocks and debris from this unit are present within the landslide deposits that underlie the landfill site. The Columbia River Basalts generally make up flat-lying beds that show no disturbance or alteration. The Columbia River Basalts consist of mostly fine-grained, dense rocks. These rocks are cut by numerous primary cooling discontinuities that range from columnar jointing to brickbat jointing.

Within landslide deposits, the Columbia River Basalt can form blocks and slide debris. Slide debris generally consists of angular rock fragments of cobble and larger sizes with voids between. This material can be highly permeable.

2.2.2 Overburden

The overburden assemblage beneath Bradford Island is a heterogeneous assemblage of two major landslide deposits; river alluvium and mixtures of river alluvium and slide materials. This assemblage varies along the length of the island. The upstream end of the island where the landfill is located is dominated by large landslide block(s) from the Tooth Rock Landslide. This landslide forms the oldest surficial (overburden) deposits at the site, and are the most significant unit at the site. Following the Tooth Rock Landslide, alluvial materials have been deposited around the block(s) particularly in the downstream direction beneath the bulk of Bradford Island. These deposits are in turn covered by another landslide, the Bonneville Landslide that occurred between 400 and 800 years ago. This landslide deposit is in turn buried beneath additional alluvial materials.

2.2.2.1 Tooth Rock Landslide. At the upstream end of the island, in the vicinity of the landfill site, the island is dominated by large Eagle Creek slide block(s). These blocks are part of the Tooth Rock

Landslide that originated from the Oregon side of the Columbia River Gorge. Exploratory data collected over the last 60 years at the site indicates that these blocks and the incorporating Tooth Rock Landslide directly overlie bedrock in this area. The Tooth Rock Landslide occurred during the last great ice age when sea level was as much as 450 feet lower than its present level, and the Columbia River valley floor as much as 200 feet deeper than its present elevation. Great floods occurred at this time that stripped most of the surficial deposits from the walls and floor of the Gorge. These floods and the removal of buttressing surficial materials from the Gorge walls were instrumental in the failure of the Tooth Rock Landslide.

The Tooth Rock Landslide is a large rotated rock block failure in which the failed rock units were more or less passively transported on a thick failure arc of granulated Weigle formation that cut deep into the Weigle formation. Movement on this landslide was restricted by several igneous intrusions at the toe of the slide. These intrusions allowed the landslide to rotate but prevented the rotational movement from transitioning to lateral movement. The original rock units have been displaced both vertically and horizontally by rotation, but except for the basal shear zone of granulated Weigle formation materials, the materials within the slide generally remain rock-like.

2.2.2.2 Post Ice Age Alluvium. Downstream of the exposed Eagle Creek slide blocks and overlying the bedrock-rock block contacts, alluvial materials are present that represent the aggradation of the Columbia River Channel following the end of the ice age. The alluvial materials near the bedrock surface generally contain a relatively high percentage of materials eroded from the landslide deposit. The percentage of slide materials generally decreases upwards. The alluvial materials are generally open and very permeable sand and gravels and form an aquifer beneath all but the upstream part of Bradford Island.

This unit does not extend upstream beneath the land fill site. However, this unit is in direct contact with the large Eagle Creek slide block that underlie the site. Slide debris zones between blocks are considered to be hydraulically connected to this unit which influences the water level encountered in the debris zones.

2.2.2.3 Bonneville Landslide. Approximately 400 to 800 years ago, a large run out landslide occurred on the Washington side of the Gorge adjacent to the present day Bonneville Lock and Dam

Project. This landslide, known as the Bonneville Landslide, flowed across the Columbia River valley floor and against the Oregon side and formed a temporary debris dam that impounded the Columbia River. A relatively thin layer of slide debris from this landslide covered the project area and formed an impermeable layer over the pre-landslide alluvial materials. This unit has been partly eroded from the Bradford Island site. It is not present at the landfill site.

Shortly following the landslide, the river breached the debris dam. It is unknown how high the impounded waters rose before the breach occurred. The COE estimates the lake elevation could have been as high as elevation plus 180 feet msl. It is expected that the resulting flood swept over and around the Tooth Rock Landslide blocks removing any traces of the Bonneville Landslide deposit and partly eroding the blocks. The flood also eroded materials from the debris dam, and transported and redeposited the materials downstream in the Bonneville area and up to 4 miles downstream forming a large deltaic fan deposit that originally spanned the entire valley floor. Particle sizes are expected to vary with distance from the debris dam. Near the site of the debris dam (i.e., upstream of the Bonneville Lock and Dam Project) the largest blocks are expected to have dropped out as the energy level of the flood progressively decreased. Rock blocks to 20 feet in dimension have been encountered in this unit at distances of up to 2 miles below Bonneville Dam. The lower parts of this unit contained the greatest amounts of slide debris and are relatively impermeable. The upper part of this unit grades into more typical alluvial deposits and the terraced surfaces in the area.

The original pre-landslide channel existed to the north of the present day Bonneville Lock and Dam Project area. The breach occurred to the south near the Oregon side of the Gorge, and permanently changed the course of the river in this area. During and following the deposition of the deltaic deposit the river eroded numerous channels through the deposit, and dissected the delta into the numerous terraces and islands that exist today. The main channel of the Columbia River prior to the construction of Bonneville Dam ran adjacent to the north side of Bradford Island, adjacent to the present site of the landfill.

2.2.3 Hydrologic Model

The hydrologic model for the site consists of generally impermeable Eagle Creek slide block material that underlies the landfill site. Up to 20 feet of surficial, relatively permeable materials overlie the slide block material. Water at the site is expected to percolate downward through the surficial

materials to the top of the impermeable slide block where it forms a perched water table. This water is expected to follow the surface of the slide block seeking the lowest point. This could follow one of two scenarios: 1) the water seeps along the top of the northward sloping block to pool; and/or 2) the water seeps into local cracks or debris zones within the block that are connected to the confined aquifer beneath Bradford Island.

Based on prior drilling and subsurface explorations at the site, the confined aquifer consists of the alluvial materials that were deposited between the two landslide events. This material has been found to be highly permeable. A study of this aquifer was performed as part of the New Navigation Lock work. It is presented in presented in the memorandum entitled *Design Memorandum No. 3, Supplement 1, Bonneville Navigation Lock, Columbia River, Oregon/Washington, Geology, Excavation and Foundation Design*, dated January 1988. Piezometric levels within the unit generally reflect tailwater levels rather than pool levels suggesting the open nature of this unit. Inflow from the Bonneville pool is greatly restricted by siltation along the upstream face of Bradford Island. Hydrologic conditions encountered onsite during site inspection field activities are described in Section 4.1 Site Hydrogeology.

2.3 SITE HISTORY

This section provides a brief summary of the Bonneville Lock and Dam Project and Bradford Island landfill site history. The information in this section was provided by the CENWP in the document entitled *Detailed Statement of Work for Contract No. DACW57-96-D-0009, Tetra Tech Task Order No. 10, Bradford Island Landfill, Bonneville Lock and Dam Project, Cascade Locks, Oregon, Site Inspection*, prepared by the Department of the Army, Portland District Corps of Engineers and dated 17 June 1998.

The Bonneville Lock and Dam Project is a multiple-purpose hydroelectric dam spanning the Columbia River 40 miles east of Portland, Oregon, at River Mile 146. Construction of the first powerhouse and navigation lock, spillway, fish passage facilities, fish hatchery, and office and maintenance buildings at Bonneville Lock and Dam began in 1933. Although construction of the dam was not completed until the early 1940s, the dam was dedicated by Franklin D. Roosevelt on 28 September 1937. During

World War II, the military installed anti-aircraft batteries and a rifle range near the present day location of the Service Center (see Figure 2). Between 1974 and 1981, a second powerhouse was constructed on the Washington shore to aid in supplying the electrical power needs of the Northwest. A second navigation lock was constructed between 1989 and 1993 during which time the southeastern edge of Bradford Island was excavated for the approach channel. The eastern portion of Bradford Island is currently managed as wildlife habitat.

In 1993, a Corps of Engineers (COE) internal review of the Bonneville Lock and Dam site and operations was performed for compliance with environmental regulations under the Environmental Review Guide for Operations (ERGO) program. As a result of the review, the Bradford Island landfill was identified as a potential source of environmental impairment based on past waste management and disposal practices.

As a result of the 1993 COE internal review of the site and operations, personal interviews were conducted by CENWP personnel of five Project employees familiar with past waste disposal practices at the landfill site. A summary of these interviews is presented in Appendix A. The results of the personal interviews concluded the following:

- Pesticide mixing and rinsing occurred near an existing pipe outfall near the landfill;
- Grease buckets, switch gears, and cables were disposed of in the Columbia River immediately adjacent to the landfill; and
- Household trash, mercury vapor lamps, turbine oil and grease, and paint-related wastes were deposited in the landfill itself.

Based on the interviews, it was believed that dumping and material disposal had occurred on the northeast section of Bradford Island for a period of approximately 40 years and ceased in the early 1980s. In addition, as individual waste pits were filled, other waste pits were excavated within the landfill area for disposal purposes. At this time it is unknown how long disposal occurred at each of these disposal locations.

As a result of the ERGO findings and the employee interviews, the CENWP submitted a letter dated 13 June 1996 to the U.S. Environmental Protection Agency (EPA) Region 10 and the Oregon Department of Environmental Quality (DEQ) informing them of the presence of the Bradford Island landfill. In response to the letter, the EPA requested that sediment samples be collected around the landfill perimeter and that groundwater seep samples be collected in areas emanating from the side slopes of the landfill, if seeps were determined to be present.

On 24 February 1997, the CENWP performed a review of available historical aerial photographs of the landfill site between the years 1936 and 1982. A summary of this aerial photograph review is presented in Appendix A. Information derived from the aerial photograph review indicated that use of the landfill began around 1942. By 1952, the landfill appeared to be in its heaviest use. Observations indicate that deposition of trash occurred off and on until the early 1980s. Some of the materials and equipment identified as being stored in the landfill area included drums, above ground storage tanks, vehicles, lumber, and scrap metal. In addition, areas of stained soils were observed at different times on various parts of the landfill. Soil staining was primarily observed in areas where drums were stored, and in a central area which may have been a burn pile. By 1982, it appeared that the landfill had been covered with soil. Information regarding the overall aerial extent of the landfill, estimated depth of landfilled materials, or the volume of materials disposed within the landfill could not be obtained from the aerial photograph review.

The Bradford Island landfill was added to the DEQ Environmental Cleanup Site Information (ECSI) database on 1 April 1997. On 24 April 1997, the Bonneville Lock and Dam Project signed a Letter of Intent to participate in DEQ's Voluntary Cleanup Program (VCP) for the investigation and remediation of the landfill site. On 6 November 1997, the Bonneville Lock and Dam Project Manager signed a DEQ Voluntary Cleanup Agreement letter for the landfill site.

2.4 PREVIOUS INVESTIGATIONS

Only limited environmental investigation of the Bradford Island landfill site has been performed prior to the site inspection effort, including completion of several soil borings. These borings were drilled to provide geotechnical and geological information for construction activities at the Project. Piezometers

were installed in a number of these borings. The boring and piezometer construction logs associated with three of these borings were available for review and are presented in Appendix B. The locations of these three borings are shown on Figure 3. One of these three borings, DH 2002Z, was drilled through the landfill to a total depth of 115 feet below land surface (BLS) in 1976. The boring, with a surveyed surface elevation of 114.6 feet above msl, reportedly penetrated 12 feet of silty sand fill described as "oily", followed by 15 feet of intermixed fill and slide debris, followed by 88 feet of slide debris consisting primarily of sandstone, siltstone, and conglomerate. Currently, boring DH 2002Z cannot be found and is presumed to be buried within the landfill.

Two additional boring logs, D 2001Z and DH 2005Z, document conditions encountered while drilling at locations to the south (DH 2005Z) and southwest (D 2001Z) of the landfill site. Surficial lithologies described at these locations varied as a result of variations in ground surface elevations with surveyed surface elevations of 95.3 feet above msl in boring D2001Z and 140.6 feet above msl in boring DH 2005Z. Although similar geologic conditions were noted in boring DH 2005Z, unconsolidated materials were noted to a depth of approximately 72 feet BLS in boring D 2001Z.

The Bonneville Lock and Dam Project Environmental Compliance Coordinator (ECC) has inspected the piezometers constructed within these two borings and has measured the depths to groundwater in these piezometers over the period from May 1998 through September 1998. The calculated groundwater elevations associated with these groundwater measurements are presented in Table 1 below.

TABLE 1. GROUNDWATER ELEVATIONS IN FEET ABOVE MSL ASSOCIATED WITH THE U.S. ARMY CORPS OF ENGINEERS PIEZOMETERS SITE INSPECTION, BRADFORD ISLAND LANDFILL CASCADE LOCKS, OREGON				
Date Measured	Piezometer ID			Forebay Pool Elevations
	D 2001Z (NE)	D 2001Z (SW)	DH 2005Z	
5/21/98	27.45	49.35	119.95	Not Supplied
5/26/98	26.60	49.70	120.5	74.4
6/2/98	-	-	120.5	73.1
6/22/98	-	-	119.17	73.8
6/30/98	-	-	118.09	74.0
7/6/98	-	-	117.27	73.7
8/6/98	-	-	118.5	74.1
8/18/98	19.70	50.03	111.4	73.3
9/3/98	21.00	53.70	112.5	75.8
9/9/98	21.80	52.86	112.14	75.7
9/15/98	20.90	54.10	111.9	75.4

Review of the piezometer construction log associated with boring D 2001Z indicates that one piezometer was constructed within this boring. The bottom of this piezometer is reported to be at an elevation of 24.3 feet above msl, and the top of the piezometer is reported to be at an elevation of 95.3 feet above msl. However, physical inspection of this piezometer location indicated that two piezometers are present within the boring. The Project ECC measured the total depths of each of these piezometers. The bottom elevation of the northeast piezometer was measured at approximately 124 to 125 feet BLS, or 28.7 to 29.7 feet below msl as calculated from the top of casing elevation listed on the associated boring and well construction log. In addition, the bottom elevation of the southwest piezometer was measure to be approximately 49.2 feet BLS, or 46.1 feet above msl using the same calculation. Neither of these elevations match the bottom elevation of the well depicted on the associated boring and well construction log. Therefore, interpretation of the groundwater data obtained from these piezometers is not possible. Review of the piezometer construction logs associated with the remaining two borings indicates that the elevation of the top of the piezometer in DH 2002Z is at 114.65 feet above MSL and that the elevation at the top of piezometer DH 2005Z is at 140.6 feet above msl. The screened intervals are located at elevations of between 63.65 and 56.65 feet above msl in DH 2002Z, and between 10.6 and 16.6 feet above msl in DH 2005Z. However, the filter packed intervals within these two borings are reported to be between 1.35 feet below msl and 103.65 feet above msl in DH 2002Z and between 10.6 and 117.6 feet above msl in DH 2005Z.

In addition, as described in the referenced Detailed Statement of Work, on 9 October 1996 the Project ECC performed an inspection of the northern and eastern edges of the island during a period of low water. During the inspection, the Project ECC observed that there were no wet areas or evidence of seepage on the shore or on the side slopes of the island. In addition, no sheens were detected in the Columbia River at the time of the inspection. Other observations noted by the Project ECC included the presence of solid waste, including tables and cables, in the river near both the northern and eastern edges of the island.

2.5 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) developed for the Bradford Island landfill site (Figure 4) was constructed based on the results of previous site investigations, background interviews, and personal communications with Bonneville Lock and Dam personnel. Because background information available prior to the site inspection indicated the potential for contaminant concentrations to be present in both subsurface soils and groundwater, the CSM assumes that subsurface soil and groundwater quality have been impacted by the waste materials present within the landfill. The CSM also considers that there is a potential for the contaminants present within shallow groundwater beneath the landfill to migrate to the Columbia River immediately adjacent to the site. Given that no groundwater supply wells are present on Bradford Island, the CSM does not consider groundwater ingestion as an active pathway at the site.

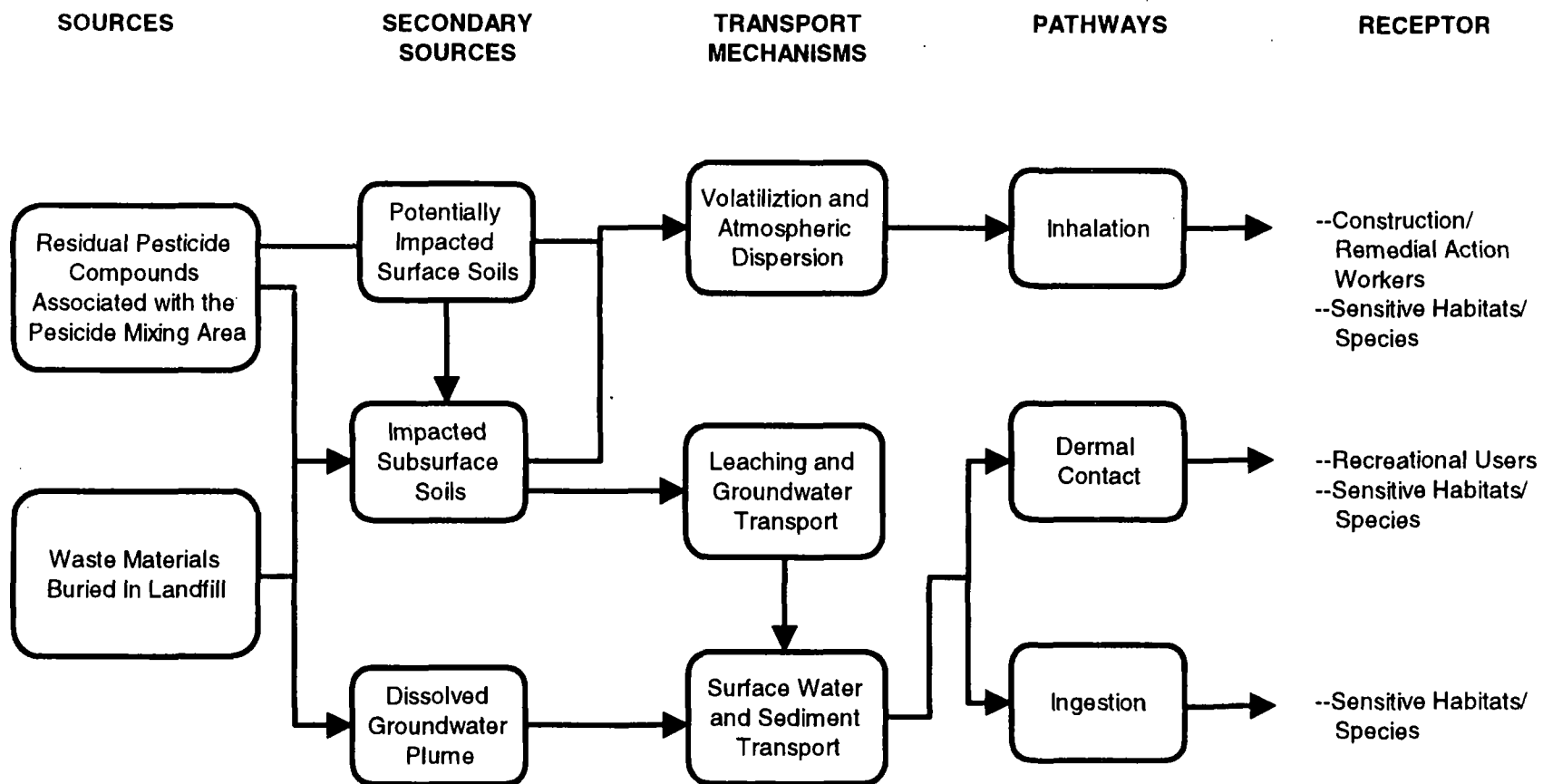


Figure 4. Conceptual Site Model. Bradford Island Landfill, Cascade Locks, Oregon.



SECTION 3.0

SCOPE AND TECHNICAL APPROACH

The following sections outline the primary objectives and scope of the site inspection performed at the Bradford Island landfill in August and September 1998. This section also provides an overview of the sampling methodologies that were implemented, and describes the management and disposal of investigation derived wastes. Further information concerning the scope and technical approach, including rationale, was presented in the final site-specific management plans (Tetra Tech 1998a,b).

3.1 OBJECTIVES

The overall sampling objective of the site inspection was to determine if disposal practices in the vicinity of the landfill have adversely impacted the environment and, if so, to determine if remedial actions are necessary or if additional investigation is warranted. The site inspection was designed to provide the CENWP with sediment, soil, and groundwater quality information beneath and adjacent to the landfill, including the four identified areas of concern. The information derived from this effort was to be of sufficient quality and quantity to support comparisons to health and ecological risk-based screening criteria, and to relevant state standards and guidelines for sediment, soil, surface water, and groundwater quality. To meet these objectives, sample locations were selected to maximize the probability of detecting a release of contaminants to the environment with respect to both lateral and vertical placement. The Bradford Island landfill site inspection analytical program was established based on the following:

- Available background information from previous environmental investigations;
- Review of background environmental and hydrogeologic information;
- CENWP review of available historic aerial photographs of the former landfill site; and
- Discussions with personnel knowledgeable regarding past material use and waste handling practices.

Although a number of the compounds that may be present at the landfill site are dense, non-aqueous phase liquids (DNAPLs) (e.g., trichloroethylene), collection of samples from deeper horizons within the aquifer was not specified for the following reasons:

- The underlying slide block was anticipated to impede downward migration and provide a target sampling depth at which DNAPLs would be expected to accumulate. Therefore, soil samples collected during drilling were to be collected at the interface of the slide block and the overburden.
- The purpose of the site inspection was to evaluate whether or not potential discharges from the four areas of concern had adversely impacted sediment, soil, or groundwater quality at the site. DNAPLs are generally hydrophobic (i.e., do not readily dissolve in water) and if they have been discharged to surface or shallow subsurface soils onsite remnants of their presence would be detected at the proposed sampling intervals.

3.2 INVESTIGATION ACTIVITIES

The Bradford Island landfill site inspection field activities were conducted in two phases. The first phase of fieldwork was conducted from August 17 through August 20, 1998, and included the collection of surface soil and subsoil samples, installation of four groundwater monitoring wells, and a survey of all sampling locations. The second phase of fieldwork, conducted September 1 and 2, 1998, included the collection of groundwater samples, as well as an attempt to collect sediment samples and conduct a visual survey of the island for the presence of groundwater seeps. The analytical results obtained from the samples collected have been used to determine the environmental status of these media in and adjacent to the four areas of concern which have been identified at the site. The following section describes the field investigation activities that were performed to meet the overall sampling objectives of the site inspection. The locations of the samples collected during the site inspection are presented on Figure 5. A photographic log of site activities is presented in Appendix C.

Figure 5

**U.S. Army Corps of Engineers
Sample Location Map**

**Bradford Island Landfill Site
Cascade Locks, Oregon**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WA 98101

TARGET SHEET

The following document was not imaged.

This is due to the Original being:

XX Oversized

 CD Rom

 Computer Disk

 Video Tape

 Other:

**A copy of the document may be requested from the Superfund Records Center.

Document Information

Document

ID #: 1269137

3.2

Site Name: Bradford Island Landfill (BILDF)

Figure 5

The following field investigation activities were conducted to meet the overall sampling objectives of the site inspection:

- A groundwater seep survey was performed to determine if rainwater that infiltrates the fill materials in the vicinity of the landfill migrates horizontally along the fill-slide block interface and enters the Columbia River via groundwater seeps.
- A total of eight test pits were excavated in and around the landfill to define the western boundary of the landfill and the locations of the disposal pits identified in interviews with Project personnel. A total of eight soil samples and three samples of building materials thought to potentially contain asbestos were collected from these test pits to determine if past disposal practices had adversely impacted the environment and/or could pose a threat to human health.
- Three shallow subsurface soil samples were collected to determine background metals concentrations on Bradford Island.
- Four groundwater monitoring wells were drilled and installed around the perimeter of the landfill using hollow-stem auger drilling techniques.
- Where subsurface conditions allowed, split spoon soil samples were collected at 5-foot intervals during drilling to facilitate lithologic logging at each drilling location. Due to poor sample recovery, only one subsoil sample was collected for laboratory analysis from the borings drilled onsite.
- One surface soil sample was collected for analysis downgradient of the pesticide mixing area to determine if residual pesticides had adversely impacted the environment and/or could pose a threat to human health.
- Each of the monitoring wells that yielded groundwater were developed, and one groundwater sample was collected for analysis from each well to determine if disposal practices had adversely impacted the shallow groundwater beneath the site.

-
- An attempt was made to collect four sediment samples from the Columbia River adjacent to the former landfill site. However, multiple sampling attempts from areas adjacent to the Bradford Island shore to areas nearing mid-channel at each of the identified areas of concern (i.e., the area north of the former landfill site and the area east of the former landfill site) were unsuccessful.
 - The surface soil, subsoil, and groundwater samples collected during the site inspection were submitted to North Creek Analytical laboratory in Bothell, Washington for analysis, as outlined in Section 3.3.1 below.
 - Project quality assurance (QA) split samples were delivered to the COE Chemical Quality Assurance Branch Laboratory in Omaha, Nebraska for analysis as specified in Section 3.3.1 below.
 - The elevation and horizontal coordinates of each sample location and each monitoring well location were surveyed by an independent surveyor licensed in the State of Oregon. Elevations were surveyed relative to the National Geodetic Vertical Datum (NGVD) established in 1929, and horizontal coordinates were surveyed relative to the National American Datum (NAD) Oregon North established in 1927. The survey results are presented in Appendix D.

3.3 SAMPLE ANALYTICAL PROGRAM

Table 2 presents a summary of the environmental samples collected during the Bradford Island landfill site inspection field activities, and the analyses performed on each sample. As indicated, the specific analyses that were performed on samples from each area of investigation were selected based on past waste disposal activities conducted in each area as reported by Project personnel. The following sections outline the analytical methods employed during the site inspection and the quality assurance sampling performed.

Table 2. Sample Analytical Summary.
Site Inspection, Bradford Island Landfill
Cascade Locks, Oregon
August/September 1998

Areas of Investigation	Sample Source	Sample Media	Depth of Sample Collection (feet BLS)	Primary Contract Laboratory			COE QA Laboratory		Laboratory Analyses							
				Sample Number ^a	QC Sample Number	Associated Trip Blank	Sample Number	Associated Trip Blank	EPA Methods ^b 8260B, 8270C, 8081A/ 8082, 8151A	TPH by Northwest Methods NWTPH ^c			Cyanide By EPA Method 9010	TAL Metals by EPA 6000/ 7000 Series Methods ^d	TAL Metals by EPA 6000/ 7000 Series Methods ^e with SPLP by EPA Method 1312 ^f	PLM by EPA Method 600/R-93/116 ^g
										HCID	Dx	Gx				
Pesticide Mixing Area	Monitoring Well	Water	20-30 ^h	MW2-GW-01		TB01		TB01	X	X	X	X	X	X		
	Surface Sample	Soil	1	PW1-SS-01					X	X	X	X			X	
Former Landfill	Borings	Soil	20	SB1-SS-01					X	X	X	X			X	
	Monitoring Wells	Water	11-21 ^h	MW3-GW-01		TB01		TB01	X	X	X	X	X	X		
			10-30 ^h	MW4-GW-01	MW5-GW-01	TB01	MW4-GW-01	TB01	X	X	X	X	X	X		
	Test Pits	Soil	10	TP1-SS-01					X	X	X	X		X		
			2	TP2-SS-01					X	X	X	X			X	
			3.7	TP4-SS-01					X	X	X	X		X		
			5	TP5-SS-01	TP9-SS-01		TP5-SS-01		X	X	X	X		X		
			4	TP6-SS-01					X	X	X	X		X		
			6.5	TP6-SS-02					X	X	X	X			X	
			4.5	TP7-SS-01					X	X	X	X			X	
			4	TP8-SS-01					X	X	X	X		X		
	Potential ACMs ^g	N/A		ASB-01												X
				ASB-02												X
				ASB-03												X
Background	Soil		0.5	BK1-SS-01										X		
			0.5	BK2-SS-01										X	X	
			0.5	BK3-SS-01										X	X	

a - All sample numbers begin with the date of sample collection and the site designation for Bradford Island Landfill (e.g. 081098-BIL).

b - Volatile organic compounds by EPA Method 8260B, semi-volatile organic compounds by EPA Method 8270C, pesticides and polychlorinated biphenyls by EPA Methods 8081A/8082, and chlorinated herbicides by EPA Method 8151A.

c - Total Petroleum Hydrocarbon (TPH) Identification by Northwest Method NWTPH-HCID followed, if detected, by diesel through heavy oil range TPH (C11-C36) by Northwest Method NWTPH-Dx, and/or gasoline range TPH (benzene-C10) by Northwest Method NWTPH-Gx.

d - EPA Target Analyte List metals including: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc by EPA Series 6000/7000 Methods.

e - Synthetic precipitate leaching procedure extraction by EPA Method 1312 followed by Target Analyte List metals by EPA Series 6000/7000 Methods.

f - Asbestos analysis using polarized light microscopy by EPA Method 600/R-93/116.

g - Asbestos containing materials, primarily building materials.

h - Screened interval of monitoring well.

3.3.1 Analytical Methods

The following is a summary of the analytical methods performed on samples collected during the site inspection field activities:

- EPA Method 8260B - volatile organic compounds (VOCs) by gas chromatography/mass spectrometry (GC/MS) (EPA 1996).
- EPA Method 8270C - semi-volatile organic compounds (SVOCs) by GC/MS (EPA 1996).
- EPA Method 8081A/8082 - organochlorine pesticides and polychlorinated biphenyls (PCBs) by gas chromatography/electron capture detection (GC/ECD) (EPA 1996).
- EPA Method 8151A - chlorinated herbicides by GC (EPA 1996).
- Northwest Total Petroleum Hydrocarbons (TPH): petroleum hydrocarbon identification (NWTPH-HCID); Diesel Range/Extended (NWTPH-Dx), and Gasoline Range (NWTPH-Gx) TPH analysis, by gas chromatography/flame ionization detector (GC/FID) (DEQ 1996).
- EPA 6000 and 7000 Series Methods - Target analyte list (TAL) metals by inductively coupled plasma and mass spectroscopy and mercury by cold vapor atomic absorption spectroscopy (EPA 1996).
- EPA Method 9010B - Total and amenable cyanide by distillation (EPA 1996)
- EPA Method Synthetic Precipitate Leaching Procedure Metals - Synthetic precipitate leaching procedure (SPLP) by Extraction Method 1312 and leachate analysis by appropriate EPA 6000 or 7000 series method (EPA 1996).
- EPA Methods 600/R-93/116 - Asbestos detection by polarized light microscopy.

3.3.2 Field Quality Assurance/Quality Control Sampling

Quality assurance/quality control (QA/QC) samples were collected during field sampling activities to evaluate sample reproducibility, the efficiency of field sampling procedures, and the potential for cross-contamination to have influenced the analytical results. A total of two QC samples were collected. These QC samples included one duplicate soil sample and one groundwater sample. The duplicate samples were delivered to North Creek Analytical Laboratory for analysis with unique sample identification numbers to avoid identification as field duplicate samples.

The field QC samples were collected in triplicate. One of each of these split samples was delivered to the COE, Missouri River Division Laboratory for analysis to allow comparison with the duplicate sample results from North Creek Analytical laboratory. The two remaining splits of each of these field QC samples were submitted to North Creek Analytical, with one split submitted under a unique sample number identified in project field documentation only as a blind duplicate.

3.4 INVESTIGATION AND SAMPLING METHODOLOGIES

The following sections present the investigation and sampling methodologies used by field personnel during the site inspection of the Bradford Island landfill site. The methodologies described below include the procedures used in the sediment sampling attempts; groundwater seep surveying; and soil, groundwater, and quality control sample collection techniques.

3.4.1 Sediment Sampling

Multiple attempts were made to collect two sediment samples from the Columbia River adjacent to both the north and east sides of the landfill site. Sample collection from the top 10 cm of sediments was attempted in each area from just off the shore of Bradford Island to approximately mid-channel of the Columbia River. A 0.1 square meter van Veen surface grab sampler was used in all sediment sample collection attempts. The van Veen grab sampler was lowered to the river bottom using the winch and davit. The sampling attempt was evaluated for sample collection using the following criteria:

-
- Sediments, or fine grained materials, were present within the sampler and the sampler was not over-filled to the point that those sediments were pressing against the top of the sampler.
 - Overlying water was present.
 - Overlying water was not excessively turbid.
 - The sediment surface was relatively flat.
 - The desired penetration depth of 10 cm had been achieved.

The van Veen grab sampler was decontaminated between collection attempts as described in Section 3.5, Equipment Decontamination.

3.4.2 Groundwater Seep Surveying

A groundwater seep survey was performed to determine if precipitation that infiltrates the fill materials in the vicinity of the landfill site migrates horizontally along the fill-slide block interface and enters the Columbia River via groundwater seeps. This survey was performed on 2 September 1998 from a boat using binoculars due to the nature of the high, steep sloped banks of the island. The sloped banks of Bradford Island, from the change in slope near the locked gate on the north to the southeastern corner of the island, were carefully examined for any signs of seepage. While the entire vertical slope was surveyed, particular attention was given to the horizon estimated to correspond with the fill-slide block interface.

3.4.3 Soil Sample Collection

The following sections detail the soil sampling methodology used by field personnel during the site inspection performed at the former Bradford Island landfill site. These methodologies were designed to ensure the collection of reliable, reproducible field and laboratory analytical data.

3.4.3.1 Soil Sample Collection from Monitoring Well Borings. Due to poor sample recovery or recovery of more rock fragments than soil, only one subsoil sample was collected during drilling activities. This sample was collected from boring SB1 (monitoring well location MW1) using a clean, 2-foot long, 2-inch inside diameter, stainless steel split-spoon sampler which was driven into the soil a distance of 18 inches at 5-foot sampling intervals, using a 140-lb hammer and a standard 30-inch drop height. The sampler was retrieved from the borehole, placed on a clean, flat surface, opened, and the sample was immediately scanned for the presence of volatile organic vapors using a photoionization detector (PID). The instrument reading was recorded on the field boring logs presented in Appendix E. The soil to be analyzed for the detection of volatile organic compounds was then placed directly into the appropriate sample containers. To avoid volatilization of contaminants, these containers were filled so that no headspace remained within the container. The following properties of the sample were then recorded on the field boring log: 1) sample length recovered, 2) presence of any slough in sampler, 3) basic soil type (e.g., sand, gravel, clay), 4) structure, 5) sorting, 6) grain size, 7) degree of saturation, 8) color, 9) odor, 10) staining, and 11) presence of foreign materials.

The soil required for the remaining chemical analyses was then placed into a stainless-steel bowl and mixed thoroughly using a disposable stainless steel spoon. The appropriate sample containers were filled with adequate volumes of material for the required analyses by separating the homogenized soil within the bowl into quadrants, and filling each container with an equal volume of soil taken from each quadrant. All sample information was recorded on the boring log form and a chain-of-custody form was prepared for the sample. Each of the properly labeled sample containers was placed in a separate resealable plastic bag to reduce the possibility of cross-contamination, and placed in a cooler with ice to maintain a temperature of 4° C for the duration of the sampling and transportation period. All sampling equipment was decontaminated between samples as described in Section 3.5, Equipment Decontamination.

3.4.3.2 Soil Sample Collection from Test Pit Excavations. A total of nine subsoil samples, including one duplicate sample, were collected during test pit excavation activities using disposable sampling equipment. Upon reaching an interval containing physical evidence of contamination, such as staining, odor, or elevated PID readings; the backhoe was used to collect soil from that interval. The backhoe was also used to collect the surface soil sample downgradient of the pesticide mixing area due to the overgrown vegetation in the area. The following sample collection procedure was used for these

samples. Once the backhoe had removed the soil, the bucket was placed on the ground next to the excavation and the soil within the bucket was immediately scanned for the presence of volatile organic vapors using the PID. Instrument readings were recorded on the associated test pit logs presented in Appendix F. Soil to be analyzed for the detection of VOCs was then placed directly into the appropriate sample containers using a disposable stainless steel spoon. To avoid volatilization of contaminants, these containers were filled so that no headspace remained within the container. In addition, care was taken to avoid collecting soils that were in contact with the bottom or sides of the backhoe bucket. The following properties of the sample were then recorded on the test pit log: 1) basic soil type (e.g., sand, gravel, clay), 2) structure, 3) sorting, 4) grain size, 5) degree of saturation, 6) color, 7) odor, 8) staining, and 9) presence of foreign materials.

The soil required for the remaining chemical analyses was then homogenized in place using the disposable stainless steel spoon. Again, care was taken to avoid homogenizing or collecting soils that were in contact with the backhoe bucket. The appropriate sample containers were then filled with adequate volumes of material for the required analyses by separating the homogenized soil in to quadrants and filling each container with an equal volume of soil taken from each quadrant. All sample information was recorded on the test pit log form and a chain-of-custody form was prepared for the samples. Each of the properly labeled sample containers was placed in a separate resealable plastic bag to reduce the possibility of cross-contamination and placed in a cooler with ice to maintain a temperature of 4° C for the duration of the sampling and transportation period. The backhoe bucket was decontaminated between samples as described in Section 3.5, Equipment Decontamination.

3.4.3.3 Background Surface Soil Sample Collection. A total of three background surface soil samples were collected using disposable sampling equipment. All surface debris was removed from the selected sampling location, along with the top 6 inches of soil in an area a minimum of 1 square foot in size. The soil within the sampling area was scanned for the presence of volatile organic vapors using the PID, and the instrument readings were recorded on the field sampling logs provided in Appendix F. The following properties of the sample were then recorded on the field sampling log: 1) basic soil type (e.g., sand, gravel, clay), 2) structure, 3) sorting, 4) grain size, 5) degree of saturation, 6) color, 7) odor, 8) staining, and 9) presence of foreign materials.

The soil from the interval between 6 inches and 1 foot BLS in the proposed sampling area required for chemical analysis was homogenized in place using a disposable stainless steel spoon. The appropriate sample containers were filled with adequate volumes of material for the required analyses by separating the homogenized soil in to quadrants, and filling each container with an equal volume of soil taken from each quadrant. All sample information was recorded on the field sampling log form and a chain-of-custody form was prepared for the samples. Each of the properly labeled sample containers was placed in a separate resealable plastic bag to reduce the possibility of cross-contamination and placed in a cooler with ice to maintain a temperature of 4° C for the duration of the sampling and transportation period.

3.4.4 Groundwater Monitoring Well Construction

Groundwater monitoring wells were installed in four of the five soil borings drilled onsite to the overburden/slide block interface. The construction logs associated with these wells are presented in Appendix G. Each well consisted of flush-threaded, Schedule 80, polyvinylchloride (PVC) casing composed, from bottom to top, of a 1-inch sand trap threaded to at least 10 feet of 0.010-inch factory-slotted screen and topped with blank casing. A 20-foot screened interval was installed in well MW4 due to the elevation of the groundwater encountered in this well in relation to the depth at which the slide block was encountered. In each well the screen extended a minimum of 5 feet above the static water level. A 10-foot screened interval was installed in well MW1 to accommodate unknown groundwater fluctuations, because groundwater was not encountered above the slide block at this location. The blank casing was cut to a length that placed the top of the casing string no more than 2.14 feet above the adjacent ground surface. The casing string was cleaned using pressurized hot water and then inserted into the boring through the hollow stem of the augers and filter pack material was placed around the well screen as the augers were removed from the boring. Filter pack material consisted of 20/40 Colorado well-rounded silica sand. The filter pack material in each well extends from the bottom of the boring to a minimum of 2 feet above the top of the screened interval, as measured with a weighted measuring tape.

With the exception of well MW1 which did not contain water, after placement of the filter pack the entire length of each well screen was surged. Cascade attaches the surge block to a 10-foot long, 50-lb stainless steel surge weight and then to a free fall sampling winch. This sampling winch is capable of lifting a 140-lb sampling weight as quickly as a cathead, but utilizes a free fall drop, similar to a cable

tool spudding wheel. However, the wells were surged using long, slow strokes of the surge block for a minimum of 5 minutes. The surge block was then removed from the well and the filter pack was checked for settlement using a weighted measuring tape. Additional filter pack material was added as necessary and the process was repeated until no change in the elevation of the filter pack was noticed after surging. The surge block and measuring tape were cleaned with pressurized hot water prior to use in each well. A minimum of 2 feet of bentonite chips was placed above the filter pack in each well as a sanitary seal. This seal was hydrated with potable water and allowed to expand for a minimum of 5 minutes prior to placement of the cement/bentonite grout. Cement/bentonite grout was placed above the sanitary seal to the ground surface using a tremie pipe. A 5-foot protective steel casing was installed over each completed monitoring well. A concrete pad sloped away from the well was constructed around the protective metal casing and three protective steel posts were installed around the concrete pad.

3.4.5 Groundwater Monitoring Well Development

Each groundwater monitoring well that yielded groundwater was developed 24 hours after completion of well installation using a dedicated, disposable polytetrafluoroethylene (PTFE), bottom-filling bailer. The well development logs are presented in Appendix G. Groundwater was removed from each well and a turbidity meter was used to measure the turbidity of the water removed from the well after each saturated casing volume. In cases where the water removed from the well was visually turbid, turbidity was measured at less frequent intervals until the water appeared clearer. Turbidity measurements were then taken at intervals of once per casing-volume of water removed. Bailing continued until the turbidity measurements remained within 10 percent of each other over three consecutive saturated casing volumes.

3.4.6 Groundwater Sample Collection

One groundwater sample was collected from each of the three groundwater monitoring wells that yielded water; specifically wells MW2, MW3, and MW4 (refer to Figure 5). These samples were collected 11 days after the completion of well development according to the following groundwater sampling procedures. The headspace within each well was immediately scanned upon opening using the PID and the instrument reading was recorded on the associated groundwater sampling log form. An electronic interface probe was then used to determine if a layer of petroleum product was present within the well. No product layers were detected within the three wells. A minimum of three saturated

casing volumes of water were removed from each well prior to sampling using a clean, dedicated, disposable PTFE bailer. The temperature, pH, specific conductance, and turbidity of the purged water were measured between each casing volume of water removed from the well, and these measurements were recorded on the groundwater sampling log forms presented in Appendix G.

Groundwater was transferred from the well to the appropriate, pre-preserved, pre-labeled sample bottles using the dedicated, disposable PTFE bailer at well location MW2, and the peristaltic pump with dedicated polyethylene tubing, at well locations MW3 and MW4. The depth to groundwater in monitoring well MW2 precluded the use of a peristaltic pump for sampling purposes. The groundwater samples were collected in the order of volatilization sensitivity (i.e., volatile organic samples first, then other organic samples). Volatile organic analysis (VOA) sample containers, in particular, were filled carefully with minimum turbulence and aeration. VOA sample containers were filled so as to be completely free of bubbles, and care was taken not to overfill the pre-preserved bottles. Each sample container was sealed in a resealable plastic bag to reduce the possibility of cross-contaminating other samples. The properly labeled and sealed sample bottles were placed in a cooler with ice to maintain a temperature of 4° C for the duration of the sampling and transportation period. All the sample information was recorded on the groundwater sampling log form and chain-of-custody documents were completed for the samples.

3.4.7 Quality Control Sample Collection

A total of three quality control samples associated with the site inspection were submitted to the analytical laboratory, including one groundwater duplicate, one soil replicate, and one trip blank sample. These samples and their associated analyses are presented on Table 2.

Field duplicate and replicate samples were collected at the same time, in the same manner, and from the same material as the associated primary sample. Field duplicate and replicate samples were submitted to the laboratory for the identical analyses as the primary sample, but were given a different sample number to allow evaluation of the reproducibility of both field collection and laboratory analysis techniques.

No equipment rinse blank samples were collected because only one soil sample was collected during hollow stem auger drilling using the split spoon sampler and no sediment samples were collected.

The trip blank sample containers were filled with distilled water by the laboratory and transported with the remaining VOA sample containers through all stages of sample collection and transportation. These samples were then analyzed for the presence of VOCs to determine if the sample containers had been contaminated during any stage of sampling or transportation.

3.5 EQUIPMENT DECONTAMINATION

All non-expendable equipment used during the Bradford Island landfill site inspection was decontaminated prior to, and after each use. The sampling equipment used during groundwater sample collection was dedicated and disposable. Therefore, decontamination of groundwater sampling equipment was not necessary. Tapes, well sounders, and water quality probes were rinsed in distilled water, or cleaned in a tri-sodium phosphate solution and rinsed once with distilled water after each use. Decontamination of sediment sampling equipment consisted of removing the gross contamination from the equipment by brushing and then rinsing with tap water, washing the equipment in a solution of alconox and tapwater, rinsing with tap water, and then rinsing with distilled water.

The drill rig and all drill bits and augers were decontaminated prior to commencing the first boring and before leaving the site. In addition, the drill bits and augers were decontaminated between each boring location. Decontamination of this equipment consisted of a pressurized hot water cleaning. All pressurized hot water cleaning activities were performed within a self-contained decontamination trailer. The backhoe was also decontaminated prior to commencing the first test pit and before leaving the site. In addition, the backhoe bucket was decontaminated between each test pit and between samples in the event that more than one sample was collected in a test pit. Decontamination of this equipment consisted of removing the gross contamination from the equipment by brushing and power washing the equipment with tap water. All decontamination water was contained and pumped into DOT-approved 55-gallon drums.

Based on the scope of the sampling program at the landfill site, and to minimize the generation of investigation-derived wastes, solvents were not used as a part of the decontamination process during the site inspection for the following reasons:

-
- The only sampling activities during which non-disposable sampling equipment was scheduled to be used were the collection of soil samples from monitoring well borings and sediment sample collection. An effort was made to locate the monitoring well borings outside the landfill site. In addition, given the history of the landfill, and the sediment scouring that occurs within the Columbia River, the anticipated concentrations of contaminants with the highest potential for carry-over—such as PCBs, oils, and polynuclear aromatic hydrocarbon (PAH) compounds—were expected to be low in these areas of investigation. Due to poor soil and sediment recoveries during the sampling efforts performed during the site inspection, only one soil sample was collected from the monitoring well borings, and no sediment samples were collected.
 - The typical procedure of air drying after the solvent wash is not easily achieved in the Pacific Northwest and therefore the decontamination solvent could have been introduced into future samples.

The analytical laboratory purchased, preserved (where appropriate), and supplied sample containers that had been pre-cleaned in accordance with EPA specifications.

3.6 INVESTIGATION DERIVED WASTE

Investigation-derived waste (IDW) management activities included the proper transfer, labeling, and storage of all waste media. All wastewater, including decontamination liquids and water purged from the wells during sampling, was transferred into DOT-approved 55-gallon drums, as needed, and at the end of each day. In addition, all drill cuttings accumulated during well installation were stored in 55-gallon drums. All 55-gallon drums containing IDWs were properly labeled and left onsite at the request of the Project ECC's representative, for future transportation to a central storage location by Project personnel.

Tetra Tech recommends that the IDW's generated during the site inspection be sampled by media to determine disposal and/or treatment options. This would include collecting samples from the soil

cuttings derived from the borings drilled onsite, the decontamination water generated during site inspection field activities, and the purge water generated during monitoring well sampling activities performed onsite. Sample analyses should include Resource Conservation and Recovery Act (RCRA) metals using the toxicity characteristic leaching procedure (TCLP), diesel range TPH analyses, and any other analyses that may be required by the selected disposal/treatment facility.

SECTION 4.0

INVESTIGATION RESULTS

The following sections detail the results of site inspection performed at the Bradford Island landfill. These results include a summary of site lithology and hydrology derived from data obtained during soil boring, test pit installation, and well installation activities onsite. In addition, an estimate of the volume of material disposed within the landfill and the aerial extent of the landfill is provided, based on data obtained from the test pit excavations onsite. The analytical results of soil and groundwater samples collected during the landfill site inspection and a summary of the data quality evaluation performed are also included in this section.

4.1 SITE HYDROGEOLOGY

Soils encountered during the drilling and excavation activities performed onsite consisted of a brown, well-graded, dense material with varying percentages of sand, gravel, and silt underlain by black fractured basalt to weathered dark gray ash tuff. At more shallow depths, the basalt had weathered along the fractures to form a clay matrix. In addition, the dark gray ash tuff encountered in these borings had a sandstone-like appearance. The unconsolidated material extended to depths of 2.5 feet BLS at test pit TP2 on the western edge of the landfill, 2 feet BLS at test pit TP3 on the eastern edge of the landfill, and greater than 11 feet BLS in the center of the landfill at test pit TP1 (refer to Figure 5). A gray, well-graded sand layer was encountered in test pit TP7 at 4 feet BLS which was observed to extend to a depth of over 7 feet BLS. This gray sand layer was also encountered in test pit TP8 at 1 foot BLS and extended to a depth of 2 feet BLS.

Groundwater was not encountered within any of the 8 test pit excavations. However, water was encountered beneath the site during drilling and well installation activities at depths ranging from approximately 17 feet BLS in the well MW4 boring to 32 feet BLS in the well MW2 boring. The shallow water encountered during drilling did not appear to be present uniformly across the area of investigation. Once these groundwater levels had stabilized following well installation, static water

levels measured prior to groundwater sampling ranged from 10.82 feet BLS in well MW2 to 17.82 feet BLS in well MW3. The water level elevations measured at the onset of groundwater sampling are presented adjacent to each groundwater monitoring well on Figure 5. Based on these groundwater elevations, the shallow groundwater at the former Bradford Island landfill site is believed to be laterally discontinuous. In addition, although a seep survey was performed to determine if the shallow groundwater onsite was migrating to the Columbia River, no groundwater seeps were detected. Therefore, estimates of groundwater flow direction and gradient have not been made based on this single measurement event.

4.2 INVESTIGATION ACTIVITIES SUMMARY

The following sections provide a summary of the field activities performed during the Bradford Island landfill site inspection and the conditions encountered.

4.2.1 Magnetometer Survey

Prior to conducting the fieldwork onsite, the site was surveyed by Applied Professional Services, Inc. (APS) of Portland, Oregon using a Metrotech 810 magnetometer to ensure that the selected boring locations were clear of any underground utilities or obstructions. In addition, an attempt was made to determine the locations of the waste disposal areas identified during interviews with Bonneville Lock and Dam Project personnel. Five separate but distinct potential waste disposal areas were identified. Tetra Tech also used a Ferro-Trak™ FT-60 magnetic locator to better define the disposal areas identified by APS and to aid in test pit placement. During test pit excavation, waste materials were encountered in each of the five areas identified by APS during the magnetometer survey. These areas correlate with test pits TP1, TP5, TP6, TP7, and TP8.

4.2.2 Soil Boring and Monitoring Well Installation

The project work plan specified installation of four soil borings to the overburden/slide block interface beneath the site, using hollow stem auger drilling techniques. However, a total of five soil borings were drilled after refusal was encountered at a depth of 7 feet BLS at boring location SB3. The field logs associated with these borings are presented in Appendix E. Cascade Drilling, Inc. of Woodinville,

Washington provided drilling services for the Bradford Island landfill site inspection. The project work plan also specified collection of two subsoil samples from each of the four planned soil borings. However, due the subsurface conditions encountered and resultant poor soil recovery during split-spoon sampling, only one subsoil sample was collected, which was designated as sample SB1-SS01, which was collected from boring SB1.

Groundwater monitoring wells were installed in the four completed soil borings to determine: 1) the gradient and/or direction of flow of the shallow groundwater beneath the site, 2) whether the waste materials present within the landfill had adversely impacted shallow groundwater and, if so, 3) whether contaminants were migrating offsite. Therefore, one well was placed adjacent to and on each side of the landfill to the north, east, south, and west (Figure 5). Well drilling efforts continued at each location until the top of the slide block was encountered. In addition, well MW2 was placed on the south side of the landfill, immediately adjacent to the pesticide mixing area, to determine if past practices had affected groundwater quality in this area. It should be noted that during drilling, a piece of metal was observed to have wrapped around the auger flights when they were removed from the boring placed on the north side of the landfill. The presence of this piece of metal and field observations during completion of test pit TP5 (refer to Figure 5) appear to indicate that monitoring well MW4 was installed at or inside the northern boundary of the landfill. The construction diagrams associated with the four groundwater monitoring wells are presented in Appendix G.

No groundwater was encountered above the slide block during the drilling of soil boring SB1 (well MW1). However, well MW1 was installed at this location in accordance with the work plan to monitor groundwater fluctuations in this area, as well as the potential for groundwater to be seasonally present at this location. Three of the four groundwater monitoring wells—MW2, MW3, and MW4—were subsequently developed according to the procedures presented in Section 3.4.5, Groundwater Monitoring Well Development. Well MW1 could not be developed because water was not present within the well. During development, groundwater infiltration rates were found to be low in wells MW2 and MW4. Well MW2 repeatedly purged dry after removal of each 2.5 gallons of water from the well, and well MW4 purged dry after removal of each 4 gallons of water from the well. The groundwater elevations measured within wells MW2 and MW3 on August 19, 1998, prior to well development activities, were 87.46 feet above msl and 97.55 feet above msl, respectively. These elevations are more than 13 feet higher than the forebay pool level measurement of 74.4 feet above msl

on that same day. The groundwater elevation of 97.54 feet above msl measured in well MW4 on August 20, 1998, prior to well development activities, is more than 22 feet higher than the forebay pool level measurement of 74.9 feet above msl on that same day.

4.2.3 Surface Soil Sampling

Four surface soil samples were collected at the site during the landfill site inspection. Three of these samples were collected from areas outside the assumed landfill boundary, to determine the background concentrations of the 23 TAL metals present on Bradford Island. These samples were collected from a depth of 0.5 feet BLS. The fourth surface soil sample was collected from a location immediately adjacent to, and topographically down slope of the pesticide mixing area, to determine if past waste handling practices in this area had adversely impacted surficial soils in this area. This sample was collected from a depth of 1 foot BLS.

4.2.4 Test Pit Excavation and Sampling

A total of eight test pits were excavated onsite by Ganco Environmental Construction, Inc. of Gresham, Oregon. The field logs associated with these test pits are presented in Appendix F. The locations of test pits TP1, TP5, TP6, TP7, and TP8 were based on the results of the magnetometer survey performed onsite (Figure 5). Waste materials—including broken glass, metal debris, metal cables, asbestos-containing and non-asbestos-containing building materials, ceramic insulators, and household trash—were present within test pit TP1 from a depth of 2 feet BLS, to the total excavation depth of 11 feet BLS. One subsoil sample was collected from the south end of test pit TP1, at a depth of 11 feet BLS. Test pit TP5 was observed to contain rubber tires, broken glass, and what appeared to be crates of mercury vapor lamps. The soil present in test pit TP5 was observed to be black and oily from a depth of 2.5 feet BLS to the total excavation depth of 5 feet BLS. One subsoil sample was collected from the center of test pit TP5 at the completion depth of 5 feet BLS. Test pit TP6 contained two areas of petroleum hydrocarbon-stained sandy, gravelly silt, with some charcoal present from 2 feet BLS to the total excavation depth of 6.5 feet BLS. In addition, some metal debris and what appeared to be dried paint residue was present at the far west end of test pit TP6, from a depth of 4 feet BLS to the total excavation depth of 6.5 feet BLS. Two subsoil samples were collected from test pit TP6, one from each distinct area of staining. Sample TP6-SS-01 was collected from the stained area located toward the east end of test pit TP6 at a depth of 4 feet BLS. Sample TP6-SS-02 was collected from the

stained area at the west end at a depth of 6.5 feet BLS. Test pit TP7 contained wood debris, fiberglass insulation, charcoal, plastic, and rubber hoses from a depth of 5 feet BLS to the total excavation depth of 7 feet BLS. These waste materials were present within a well-graded gray sand that extended from 4 feet BLS to the total excavation depth of 7 feet BLS. Sample TP7-SS-01 was collected within this well graded sand at a depth of 4.5 feet BLS, 0.5 feet above the waste materials present within this test pit. This well-graded gray sand layer was also observed to be present within test pit TP8 from 1 to 2 feet BLS. Test pit TP8 was observed to contain metal debris, glass bottles, metal pipes, charcoal, and concrete-asbestos board, from 2 feet BLS to the total excavation depth of 4 feet BLS. One subsoil sample was collected from approximately the center of test pit TP8 at a depth of 4 feet BLS.

Test pit TP2 was excavated at the west end of the landfill area to locate the western edge of the landfill. An area of petroleum hydrocarbon-stained silty, gravelly sand with some metal debris and cables was found at the east end of test pit TP2. One subsoil sample was collected from this stained area at a depth of 2 feet BLS. Test pits TP3 and TP4 were excavated at the east end of the landfill area to locate the eastern edge of the landfill. Consolidated, weathered, fractured basalt was encountered at a depth of 2 feet BLS throughout test pit TP3. No stained soil or waste materials were encountered in the test pit TP3 excavation. Therefore, no subsoil samples were collected from this test pit. One area of petroleum-stained gravelly, silty sand was present just east of the center of test pit TP4, that extended from 2 feet BLS to the contact with the consolidated, weathered, fractured basalt at 3.7 feet BLS in this area. One subsoil sample was collected from this stained area at a depth of 3.7 feet BLS.

4.2.5 Groundwater Sample Collection

Groundwater samples were collected from monitoring wells MW2, MW3, and MW4 according to the procedures presented in Section 3.4.6. A groundwater sample could not be obtained from monitoring well MW1 because no water was present within the well. It was not possible to purge or sample well MW2 using the specified peristaltic pump system, because the depth to groundwater within the well was beyond the lift capabilities of the pump. In addition, this well purged dry after removal of approximately 5 gallons of water from the well. The groundwater recovery rate in well MW2 was measured and calculated to be approximately 0.0096 feet per minute. Well MW4 was sampled using the peristaltic pump, but purging was completed using a disposable bailer. This well also purged dry after removal of approximately 7 gallons of water from the well. The groundwater recovery rate in well MW4 was measured and calculated to be approximately 0.6 feet per minute. The groundwater

elevations measured within these three wells prior to groundwater sampling activities on September 1, 1998, ranged from 105.74 feet above msl in well MW2 to 97.40 feet above msl in well MW3. These elevations are more than 22 feet higher than the forebay pool level measurement of 75.2 feet above msl on that same day.

4.2.6 Seep Survey and Sediment Sampling

A survey of the steep cliff surrounding the east end of Bradford Island was performed as described in Section 3.4.2, Groundwater Seep Survey, to determine if the shallow groundwater present beneath the site was seeping into the Columbia River. The limits of this survey are demarcated by the slash marks presented on Figure 5. No evidence of groundwater seepage was observed during this survey. In addition, Tetra Tech personnel visually examined the shallow water adjacent to the cliff face for signs of the solid waste reportedly disposed in these areas. However, the river bottom was only visible on the east end of the island due to limited water clarity and river depth at the time of the survey. No waste materials were observed in this area during the visual survey.

Multiple sampling attempts were made to collect sediments from within the Columbia River adjacent to the landfill site. Approximately 10 to 15 attempts to collect sediments were made immediately adjacent to the north side of landfill. Water depths in this area ranged from approximately 20 to 50 feet. All attempts to collect sediments resulted with either no retrieval of sediment or retrieval of only large rocks and cobble that were unsuitable for sampling. Therefore, approximately five additional attempts were made to collect sediments from further out in the river channel, north of the landfill site. Water depths in this area ranged from approximately 75 to 100 feet. Sediment collection efforts at these locations produced similar retrieval results as the sampling attempts closer to the shoreline.

A similar number of attempts were made to collect sediment in the river immediately adjacent to the east side of the landfill. Water depths in this area at the time of sampling ranged from approximately 15 to 45 feet. The water in this area was observed to be at a lower surface flow velocity than encountered on the north side of the island, and appeared to present a higher probability of sediment accumulation on the river bottom in this area. However, after repeated attempts, no sediment could be obtained. In addition, attempts were made to collect sediments from approximately 100 to 150 feet from the east end of the landfill, in waters ranging from 50 to 75 feet in depth. Again, no sediment could be obtained in this area.

4.3 SAMPLE ANALYTICAL RESULTS

The following sections summarize the analytical results of the soil, asbestos, groundwater, and quality control samples collected during the site inspection activities conducted at the former Bradford Island landfill. The laboratory analytical reports from the landfill site inspection are presented in Appendix H. The complete analytical laboratory data package for the Bradford Island site inspection effort is available in CENWP and Tetra Tech project files.

In addition to the screening criteria presented in the project work plan, all leachable metals concentrations detected in the soil samples and all contaminant concentrations detected in the groundwater samples have been compared to chronic freshwater criteria, due to the potential for these contaminants to migrate to the Columbia River. In the comparison of sample results with applicable screening levels, it is important to note that laboratory reporting limits for certain compounds and their associated practical quantitation limits (PQLs) exceeded the corresponding screening levels. The compounds for which PQLs exceeded screening levels were identified in the project Sampling and Analysis Plan prepared prior to the site inspection (Tetra Tech 1997).

The additional compounds for which laboratory reporting limits in specific samples exceeded the corresponding screening levels due to matrix effects or necessary sample dilution are outlined below:

- The compound Alpha-BHC exceeds the DEQ numeric soil cleanup level (NSCL) in samples TP1-SS-01, TP5-SS-01, TP6-SS-01, TP7-SS-01, and TP9-SS-01.
- All of the PCB Aroclors exceed the DEQ NSCLs in samples TP1-SS-01, TP2-SS-01, TP5-SS-01, TP6-SS-01, TP7-SS-01, and TP9-SS-01.
- The compounds Gamma-BHC (Lindane) and Endrin exceed the DEQ NSCLs in sample TP7-SS-01.
- The compounds benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, hexachloro-benzene, exceed the DEQ NSCLs in samples TP1-SS-01, TP2-SS-01, TP5-SS-01, TP6-SS-01, TP6-SS-02, TP7-SS-01, TP8-SS-01, and TP9-SS-01.

-
- The PAH compounds benzo(b)pyrene and dibenzo(a,h)anthracene exceed both the DEQ NSCLs and the EPA preliminary remedial goals (PRGs) in samples TP1-SS-01, TP2-SS-01, TP5-SS-01, TP6-SS-01, TP6-SS-02, TP7-SS-01, TP8-SS-01, and TP9-SS-01.
 - The compounds 3,3'-dichlorobenzidine and n-nitrosodi-n-propylamine exceed the EPA PRGs in samples TP1-SS-01, TP2-SS-01, TP5-SS-01, TP6-SS-01, TP6-SS-02, TP7-SS-01, TP8-SS-01, and TP9-SS-01.
 - The compounds bis(2-chloroethyl)ether and hexachlorobenzene exceed the EPA PRGs in samples TP5-SS-01, TP6-SS-01, TP7-SS-01, and TP8-SS-01.
 - The compound pentachlorophenol exceeds the DEQ NSCL in samples TP5-SS-01, TP6-SS-01, TP7-SS-01, and TP8-SS-01.
 - The compounds indeno(1,2,3-cd)pyrene and pentachlorophenol exceed the EPA PRGs in samples TP6-SS-01 and TP7-SS-01.
 - The compound bis(2-ethylhexyl)phthalate exceeds the DEQ NSCL in samples TP6-SS-01 and TP7-SS-01.
 - The compound 1,4-dichlorobenzene exceeds the EPA PRG in sample TP7-SS-01.

A summary report of the laboratory data quality evaluation performed on the analytical data associated with this site inspection is provided in Appendix I. Any qualification of the data based on this data quality evaluation are shown on the data summary tables included in this section, and are discussed in Appendix I.

4.3.1 Surface Soil Samples

The following section presents the analytical results for the surface soil samples collected at the landfill site. Three of these samples were collected to establish background metals concentrations on Bradford Island. In addition, one surface soil sample was collected downgradient of the pesticide mixing area to

determine if past practices in this area had adversely impacted the environment. The locations of these samples are shown on Figure 5.

4.3.1.1 Background Metals Concentrations. Soil samples were collected at three locations outside the landfill boundaries to determine the background concentrations of metals on the island. All three samples were analyzed for the presence of total TAL metals. In addition, two of the three samples also underwent SPLP extraction and subsequent analysis for the presence of leachable TAL metals.

As shown on Table 3, all three of the background samples (denoted with a "BK" prefix) contained total metal concentrations above the laboratory reporting limits. The arsenic concentration of 3.24 milligrams per kilogram (mg/kg) detected in background sample BK2-SS-01 exceeded the applicable EPA PRG and the DEQ NSCL of 3 mg/kg. In addition, the leachable iron concentrations detected in the two background samples that underwent SPLP extraction exceeded the applicable EPA freshwater chronic criteria (FCC; Table 4). No other metals concentrations above the applicable screening levels were detected in the three background samples.

4.3.1.2 Pesticide Mixing Area. The surface soil sample (PW1-SS-01) collected downgradient of the pesticide mixing area to determine if past practices in this area had adversely impacted the environment was analyzed for the detection of VOCs, SVOCs, pesticides, PCBs, herbicides, TPH, and TAL metals. TAL metals concentrations were determined following SPLP extraction. The results of this sample are summarized in Tables 4 through 9.

Volatile Organic Compounds--No VOCs were detected above laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area (Table 5).

Semi-volatile Organic Compounds--No SVOCs were detected above the laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area (Table 6).

Pesticides--Three organochlorine pesticides; 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT; were detected above laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area at concentrations of 2.29 micrograms per kilogram ($\mu\text{g/kg}$), 3.05 $\mu\text{g/kg}$, and 4.36 $\mu\text{g/kg}$, respectively (Table 7). However, these concentrations were consistently below both the

TABLE 3. TOTAL METALS IN SOIL SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (mg/kg)									Applicable or Relevant and Appropriate Requirements (ARARs) (mg/kg)	
	BK1-SS-01	BK2-SS-01	BK3-SS-01	TP1-SS-01	TP4-SS-01	TP5-SS-01	TP6-SS-01	TP8-SS-01	TP9-SS-01 ^a	EPA (PRGs) ^b	DEQ (MASC) ^c
Silver	< 0.500	< 0.500	< 0.500	46.0	< 0.500	< 0.500	< 0.500	12.0	< 0.500	9,400	10,000
Aluminum	12,000	19,500	20,200	16,600	11,200	12,600	16,000	9,020	13,200	100,000	NC
Arsenic	2.77 (J)	3.24 (J)	2.92 (J)	9.73 (J)	2.18 (J)	3.04 (J)	1.75 (J)	5.35 (J)	2.11 (J)	3	3
Barium	77.0	95.5	139	567	84.6	136	87.6	156	98.3	100,000	140,000
Beryllium	< 0.500	0.554	0.622	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	3,400	1
Calcium	6180	8030	7890	9740	6610	5050	8870	6830	5420	NC	NC
Cadmium	< 0.500	0.575	< 0.500	195	< 0.500	4.54	1.60	5.03	3.55	930	1,000
Cobalt	11.4	18.9	17.5	17.2	8.28	9.02	7.92	10.7	7.93	29,000	NC
Chromium	11.9	19.2	21.3	60.1	9.12	14.0	9.34	13.5	12.6	450	1,500
Copper	45.0	49.9	53.6	1620	28.5	55.1	53.0	204	44.7	70,000	80,000
Iron	18,900	25,600	28,300	52,700	21,500	18,100	22,400	16,900	22,300	100,000	NC
Mercury	0.101	< 0.100	< 0.500	1.61	< 0.100	1.66	< 0.100	3.50	3.52	560	600
Potassium	204	962	764	1,180	865	1100	1020	826	1020	NC	NC
Magnesium	7,090	11,700	15,900	5,180	7,070	5,860	7,840	5,840	5,660	NC	NC
Manganese	368	610	460	1,830	273	362	211	381	290	45,000	200,000
Sodium	295 (J)	393 (J)	239 (J)	471 (J)	585 (J)	404 (J)	570 (J)	433 (J)	344 (J)	NC	NC
Nickel	16.3	24.2	19.2	84.0	14.0	17.7	20.4	21.3	15.3	37,000	40,000
Lead	14.2	18.7	8.67	7,140	189	193	1,120	403	151	1,000	2,000
Antimony	< 0.500	< 0.500	< 0.500	4.49	< 0.500	0.874	< 0.500	3.05	1.16	750	NC
Selenium	0.801	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	9,400	NC
Thallium	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	NC	NC
Vanadium	42.2	61.5	73.0	26.9	34.3	40.9	31.5	37.1	38.3	13,000	NC
Zinc	53.6	55.9	60.4	8,650	57.9	114	130	381	85.7	100,000	NC

Note: Shading indicates that sample concentration exceeds ARARs. Laboratory reporting limits that exceed ARARs have not been shaded.

a - Blind replicate of sample TP5-SS-01.

b - EPA Region 9 Preliminary Remedial Goals.

c - DEQ industrial maximum allowable soil concentration (OAR Chapter 340-122-045).

NC = No criteria exists for the associated analyte.

J = Estimated concentration.

TABLE 4. SYNTHETIC PRECIPITATE LEACHING PROCEDURE METALS IN SOIL SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (mg/l)							Applicable or Relevant and Appropriate Requirements (ARARs) (mg/l)		
	SB1-SS-01	BK2-SS-01	BK3-SS-01	PW1-SS-01	TP2-SS-01	TP6-SS-02	TP7-SS-01	EPA Freshwater Chronic Criteria ^a	DEQ Freshwater Chronic Criteria ^b	DEQ (NSCL) ^c
Beryllium	< 0.00500 (UJ)	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	NC	0.0053	0.002
Cadmium	< 0.00500 (UJ)	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	0.001	0.0011	0.5
Manganese	0.340 (J)	0.0546	0.0586	0.0994	0.0343	0.144	0.0445	NC	NC	400
Cobalt	< 0.0100 (UJ)	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	NC	NC	NC
Chromium	0.0120 (J)	< 0.0100	0.0110	< 0.0100	< 0.0100	< 0.0100	< 0.0100	NC	NC	10
Copper	0.0350 (J)	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.0302	< 0.0300	0.011	0.012	100
Nickel	< 0.0300 (UJ)	< 0.0300	< 0.0300	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.16	0.160	10
Antimony	< 0.0400 (UJ)	< 0.0400	< 0.0400	< 0.0400	< 0.0400	< 0.0400	< 0.0400	NC	1.6	NC
Silver	< 0.0500 (UJ)	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	NC	0.00012	5
Zinc	< 0.0500 (UJ)	< 0.0500	< 0.0500	< 0.0500	< 0.0500	0.0746	< 0.0500	0.1	0.110	NC
Thallium	< 0.100 (UJ)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	0.040	NC
Iron	21.6 (J)	10.6	10.3	8.81	4.64	8.73	3.96	NC	1.0	NC
Selenium	< 0.150 (UJ)	< 0.150	< 0.150	< 0.150	< 0.150	< 0.150	< 0.150	0.005	0.035	NC
Arsenic	< 0.200 (UJ)	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	0.190	NC	0.004
Potassium	1.78 (J)	0.207	< 0.200	0.472	< 0.200	0.394	0.657	NC	NC	NC
Lead	< 0.200 (UJ)	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	1.35	0.0025	0.0032	2
Vanadium	< 0.200 (UJ)	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	NC	NC	NC
Barium	< 0.250 (UJ)	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	NC	NC	100
Calcium	5.55 (J)	2.71	2.38	2.03	9.50	1.85	1.52	NC	NC	NC
Aluminum	10.2 (J)	7.90	6.75	5.18	2.21	5.61	2.06	NC	NC	NC
Magnesium	14.5 (J)	3.81	4.39	4.16	2.40	2.22	< 0.500	NC	NC	NC
Sodium	64.1 (J)	61.2	61.8	64.3	45.8	43.5	22.3	NC	NC	NC
Mercury	0.00162 (J)	< 0.00100	< 0.00100	< 0.00100	< 0.00100	0.00196	< 0.00100	0.000012	0.000012	0.2

Note: Shading indicates that sample concentration exceeds ARARs. Laboratory reporting limits that exceed ARARs have not been shaded.

a - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

b - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

c - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

NC = No criteria exists for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 5. VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (mg/kg)											Applicable or Relevant and Appropriate Requirements (ARARs) (mg/kg)	
	SB1-SS-01	PW1-SS-01	TP1-SS-01	TP2-SS-01	TP4-SS-01	TP5-SS-01	TP6-SS-01	TP6-SS-02	TP7-SS-01	TP8-SS-01	TP9-SS-01 ^a	EPA (PRGs) ^b	DEQ (NSCL) ^c
1,1,1,2-Tetrachloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.8	NC
1,1,1-Trichloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1,400	9
1,1,2,2-Tetrachloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1	NC
1,1,2-Trichloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	2	0.08
1,1-Dichloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.112	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	2,000	NC
1,1-Dichloroethene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	0.01
1,1-Dichloropropene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
1,2,3-Trichlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
1,2,3-Trichloropropane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.0031	NC
1,2,4-Trichlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1,700	NC
1,2,4-Trichloropropane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.448	170
1,2-Dibromo-3-chloropropane	< 1.00 (U)	< 1.00	< 1.00 (U)	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	2.1	NC
1,2-Dibromomethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.029	NC
1,2-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	370	NC
1,2-Dichloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.76	NC
1,2-Dichloropropane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.76	NC
1,3,5-Trimethylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.57	< 0.100	< 0.100	< 0.100	< 0.100	0.189	70	NC
1,3-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	140	NC
1,3-Dichloropropane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
1,4-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	7	NC
2,2-Dichloropropane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
2-Butanone	< 2.00 (U)	< 2.00	< 2.00 (U)	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NC	NC
2-Chlorotoluene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
2-Hexanone	< 2.00 (U)	< 2.00	< 2.00 (U)	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NC	NC
4-Chlorotoluene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
4-Methyl-2-pentanone	< 2.00 (U)	< 2.00	< 2.00 (U)	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NC	NC
Acetone	< 2.00 (U)	< 2.00	< 2.00 (U)	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	6,100	NC
Benzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1.4	0.1
Bromobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	92	NC
Bromochloromethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
Bromodichloromethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	2.3	0.01
Bromoforn	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	980	0.3
Bromomethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	13	60
Carbon disulfide	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1,200	NC
Carbon tetrachloride	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1	0.2
Chlorobenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	180	50
Chloroethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
Chloroform	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1	0.4
Chloromethane	< 0.500 (U)	< 0.500	< 0.500 (U)	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	3	NC
cis-1,2-Dichloroethene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	4
cis-1,3-Dichloropropene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
Dibromochloromethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	36	NC
Dibromomethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
Dichlorodifluoromethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	310	NC
Ethylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.228	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	230	100
Hexachlorobutadiene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	38	NC
Isopropylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
m,p-Xylene	< 0.200 (U)	< 0.200	< 0.200 (U)	< 0.200	< 0.200	0.631	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	210	800
Methylene chloride	< 1.00 (U)	< 1.00	< 1.00 (U)	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	20	0.1
n-Butylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.422	< 0.100	< 0.100	< 0.100	< 0.100	0.146	550	NC
n-Propylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.172	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	550	NC
Naphthalene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.333	0.132	< 0.100	< 0.100	< 0.100	0.135	NC	30
o-Xylene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.269	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	280	800
p-Isopropyltoluene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.314	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
sec-Butylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	0.142	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	410	NC
Styrene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1,700	NC
tert-Butylbenzene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	490	NC
Tetrachloroethene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	2.12	1.34	< 0.100	NC	0.3
Toluene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	1.36	< 0.100	< 0.100	< 0.100	< 0.100	1.12	520	80
trans-1,2-Dichloroethene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	5
trans-1,3-Dichloropropene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	NC
Trichloroethene	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	NC	0.4
Trichlorofluoromethane	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	1,300	1,000
Vinyl chloride	< 0.100 (U)	< 0.100	< 0.100 (U)	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.05	0.008

a - Blind replicate of sample TP5-SS-01

b - EPA Region 9 Preliminary Remedial Goals.

c - DEQ numerical soil cleanup levels (UAR Chapter 340-122-045).

NC = No criteria exist for the associated analyte.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 6. SEMI-VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (mg/kg)											Applicable or Relevant and Appropriate Requirements (ARARs) (mg/kg)	
	SB1-SS-01	PW1-SS-01	TP1-SS-01	TP2-SS-01	TP4-SS-01	TPA-SS-01	TP6-SS-01	TP6-SS-02	TP7-SS-01	TP8-SS-01	TP9-SS-01 ^a	EPA (PRGs) ^b	DEQ (NSCL) ^c
1,2,4-Trichlorobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	1,700	NC
1,2-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	170	NC
1,3-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	140	NC
1,4-Dichlorobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	7.3	NC
2,4,5-Trichlorophenol	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	110,000	NC
2,4,6-Trichlorophenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	270	NC
2,4-Dichlorophenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	3,200	NC
2,4-Dimethylphenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	21,000	NC
2,4-Dinitrophenol	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	2,100	NC
2,4-Dinitrotoluene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	2,100	NC
2,6-Dinitrotoluene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	1,100	0.002
2-Chloronaphthalene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
2-Chlorophenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	240	NC
2-Methylnaphthalene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
2-Methylphenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	53,000	NC
2-Nitroaniline	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	64	NC
2-Nitrophenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
3-Methylphenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	53,000	NC
4-Methylphenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	5,300	NC
3,3'-Dichlorobenzidine	< 5.00 (U)	< 5.00	< 25.0	< 25.0	< 5.00	< 125 (U)	< 250 (U)	< 25.0	< 500 (U)	< 125	< 125 (U)	6.7	NC
3-Nitroaniline	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	NC	NC
4,6-Dinitro-2-methylphenol	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	NC	NC
4-Bromophenyl phenyl ether	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
4-Chloro-3-methylphenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
4-Chloroaniline	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	4,300	NC
4-Chlorophenyl phenyl ether	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
4-Nitroaniline	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	NC	NC
4-Nitrophenol	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	66,000	NC
Acenaphthene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	370	2,000
Acenaphthylene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
Aniline	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	530	NC
Anthracene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	222,000	20,000
Benzo (a) anthracene	< 0.100 (U)	< 0.100	< 0.500	1.72	0.111	< 2.50 (U)	6.31 (U)	< 0.500	84.3 (U)	< 2.50	< 2.50 (U)	3,600	0.1
Benzo (a) pyrene	< 0.100 (U)	< 0.100	< 0.500	2.05	< 0.100	< 2.50 (U)	6.03 (U)	< 0.500	103 (U)	< 2.50	< 2.50 (U)	0.36	0.1
Benzo (b) fluoranthene	< 0.100 (U)	< 0.100	< 0.500	2.88	0.132	< 2.50 (U)	7.61 (U)	< 0.500	134 (U)	< 2.50	< 2.50 (U)	3,600	0.1
Benzo (ghi) perylene	< 0.100 (U)	< 0.100	< 0.500	1.4	< 0.100	< 2.50 (U)	5.79 (U)	< 0.500	70.4 (U)	< 2.50	< 2.50 (U)	NC	NC
Benzo (k) fluoranthene	< 0.100 (U)	< 0.100	< 0.500	0.89	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	53.4 (U)	< 2.50	< 2.50 (U)	36	0.1
Benzoic Acid	< 0.500 (U)	< 0.500	2.50	< 2.50	< 0.100	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	100,000	NC
Benzyl alcohol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	100,000	NC
Bis(2-chloroethoxy)methane	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	NC	NC
Bis(2-chloroethyl)ether	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	0.56	NC
Bis(2-chloroisopropyl)ether	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	74	NC
Bis(2-ethylhexyl)phthalate	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	73.4 (U)	< 12.5	< 12.5 (U)	210	4
Butyl benzyl phthalate	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	930	NC
Carbazole	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	150	NC
Chrysene	< 0.100 (U)	< 0.100	< 0.500	1.79	0.13	< 2.50 (U)	6.54 (U)	< 0.500	89.8 (U)	< 2.50	< 2.50 (U)	360	0.1
Di-n-butyl phthalate	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	NC	NC
Di-n-octyl phthalate	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	10,000	NC
Dibenz (a,h) anthracene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	19.3 (U)	< 2.50	< 2.50 (U)	0.36	0.1
Dibenzofuran	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	3,200	NC
Diethyl phthalate	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	100,000	NC
Dimethyl phthalate	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	100,000	NC
Fluoranthene	< 0.100 (U)	< 0.100	< 0.500	2.48	0.164	< 2.50 (U)	10.5 (U)	< 0.500	136 (U)	< 2.50	< 2.50 (U)	37,000	8,000
Fluorene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	27,000	2,000
Hexachlorobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	1.9	0.4
Hexachlorobutadiene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	38	NC
Hexachlorocyclopentadiene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	7,100	NC
Hexachloromethane	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	210	100
Indeno (1,2,3-cd) pyrene	< 0.100 (U)	< 0.100	< 0.500	1.36	< 0.100	< 2.50 (U)	5.19 (U)	< 0.500	72.9 (U)	< 2.50	< 2.50 (U)	3.6	NC
Isophorone	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	3,200	NC
N-Nitrosodimethylamine	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	0.43	NC
N-Nitrosodiphenylamine	< 0.200 (U)	< 0.200	< 1.00	< 1.00	< 0.200	< 5.00 (U)	< 10.0 (U)	< 1.00	< 20.0 (U)	< 5.00	< 5.00 (U)	610	NC
Naphthalene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	190	30
Nitrobenzene	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50	< 2.50 (U)	100	NC
Pentachlorophenol	< 0.500 (U)	< 0.500	< 2.50	< 2.50	< 0.500	< 12.5 (U)	< 25.0 (U)	< 2.50	< 50.0 (U)	< 12.5	< 12.5 (U)	15	5
Phenanthrene	< 0.100 (U)	< 0.100	< 0.500	0.709	< 0.100	< 2.50 (U)	12.8 (U)	< 0.500	37.5 (U)	< 2.50	< 2.50 (U)	NC	NC
Phenol	< 0.100 (U)	< 0.100	< 0.500	< 0.500	< 0.100	< 2.50 (U)	< 0.500 (U)	< 0.500	< 10.0 (U)	< 2.50			

TABLE 7. ORGANOCHLORINE PESTICIDE AND PCB ANALYTES IN SOIL SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/kg)											Applicable or Relevant and Appropriate Requirements (ARARs) (ug/kg)	
	SB1-SS-01	PW1-SS-01	TP1-SS-01	TP2-SS-01	TP4-SS-01	TP5-SS-01	TP6-SS-01	TP6-SS-02	TP7-SS-01	TP8-SS-01	TP9-SS-01 ^a	EPA (PRGs) ^b	DEQ (NSCL) ^c
4,4'-DDD	< 1.00 (UJ)	2.29 (UJ)	3060	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	NC	3,000
4,4'-DDE	< 1.00 (UJ)	3.05 (UJ)	1830	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	NC	2,000
4,4'-DDT	< 1.00 (UJ)	4.36 (J)	9520 (J)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	NC	2,000
Aldrin	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	180	NC
alpha-BHC	< 0.500 (UJ)	< 0.500 (UJ)	< 10.5 (UJ)	< 5.50 (UJ)	< 0.500 (UJ)	< 10.5 (UJ)	< 10.5 (UJ)	< 0.500 (UJ)	< 25.5 (UJ)	< 0.500 (UJ)	< 10.5 (UJ)	670	8
alpha-Chlordane	< 0.800 (UJ)	< 0.800 (UJ)	< 16.8 (UJ)	< 8.80 (UJ)	< 0.800 (UJ)	< 16.8 (UJ)	< 16.8 (UJ)	< 0.800 (UJ)	< 40.8 (UJ)	< 0.800 (UJ)	< 16.8 (UJ)	NC	NC
Aroclor 1016	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	6,300	80
Aroclor 1221	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1232	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1242	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1248	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1254	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,800	80
Aroclor 1260	< 50.0 (UJ)	< 50.0 (UJ)	2250	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1262	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
Aroclor 1268	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	1,300	80
beta-BHC	< 0.900 (UJ)	< 0.900 (UJ)	< 18.9 (UJ)	< 9.90 (UJ)	< 0.900 (UJ)	< 18.9 (UJ)	< 18.9 (UJ)	< 0.900 (UJ)	< 45.9 (UJ)	< 0.900 (UJ)	< 18.9 (UJ)	2,300	NC
Chlordane (tech)	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	12,000	500
delta-BHC	< 0.600 (UJ)	< 0.600 (UJ)	< 12.6 (UJ)	< 6.60 (UJ)	< 0.600 (UJ)	< 12.6 (UJ)	< 12.6 (UJ)	< 0.600 (UJ)	< 30.6 (UJ)	< 0.600 (UJ)	< 12.6 (UJ)	NC	NC
Dieldrin	< 2.00 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 22.0 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 42.0 (UJ)	< 2.00 (UJ)	< 102 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	190	1
Endosulfan I	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	6,400,000	0.6
Endosulfan II	< 2.00 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 22.0 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 42.0 (UJ)	< 2.00 (UJ)	< 102 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	6,400,000	0.6
Endosulfan sulfate	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	NC	NC
Endrin	< 2.00 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 22.0 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 42.0 (UJ)	< 2.00 (UJ)	< 102 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	320,000	50
Endrin aldehyde	< 2.00 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 22.0 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	< 42.0 (UJ)	< 2.00 (UJ)	< 102 (UJ)	< 2.00 (UJ)	< 42.0 (UJ)	NC	NC
gamma-BHC (Lindane)	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	3,200	30
gamma-Chlordane	< 0.700 (UJ)	< 0.700 (UJ)	< 14.7 (UJ)	< 7.70 (UJ)	< 0.700 (UJ)	< 14.7 (UJ)	< 14.7 (UJ)	< 0.700 (UJ)	< 35.7 (UJ)	< 0.700 (UJ)	< 14.7 (UJ)	NC	NC
Heptachlor	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	< 51.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	670	0.2
Heptachlor epoxide	< 1.00 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 11.0 (UJ)	< 1.00 (UJ)	< 21.0 (UJ)	< 21.0 (UJ)	< 1.00 (UJ)	85.1 (J)	< 1.00 (UJ)	< 21.0 (UJ)	330	0.3
Methoxychlor	< 4.00 (UJ)	< 4.00 (UJ)	< 84.0 (UJ)	< 44.0 (UJ)	< 4.00 (UJ)	< 84.0 (UJ)	< 84.0 (UJ)	< 4.00 (UJ)	< 204 (UJ)	< 4.00 (UJ)	< 84.0 (UJ)	5,300,000	NC
Toxaphene	< 50.0 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	< 1050 (UJ)	< 50.0 (UJ)	< 2550 (UJ)	< 50.0 (UJ)	< 1050 (UJ)	2,700	10

Note: Shading indicates that sample concentration exceeds ARARs.

Laboratory reporting limits that exceed ARARs have not been shaded.

a - Blind replicate of sample TP5-SS-01.

b - EPA Region 9 Preliminary Remedial Goals.

c - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 8. HERBICIDE ANALYTES IN SOIL SAMPLES
 SITE INSPECTION
 BRADFORD ISLAND LANDFILL
 CASCADE LOCKS, OREGON
 AUGUST 1998

Target Analyte	Sample Designation (ug/kg)											Applicable or Relevant and Appropriate Requirements (ARARs) (ug/kg)	
	SB1-SS-01	PW1-SS-01	TP1-SS-01	TP2-SS-01	TP4-SS-01	TP5-SS-01	TP6-SS-01	TP6-SS-02	TP7-SS-01	TP8-SS-01	TP9-SS-01 ^a	EPA (PRGs) ^b	DEQ (NSCL) ^c
2,4,5-T	< 20.0 (UJ)	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC
2,4,5-TP (Silvex)	< 20.0 (UJ)	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC
2,4-D	< 5.00 (UJ)	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	14,000,000	300
2,4-DB	< 20.0 (UJ)	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	8,600,000	NC
Dalapon	< 80.0 (UJ)	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	< 80.0	32,000,000	NC
Dicamba	< 5.00 (UJ)	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	32,000,000	NC
Dichlorprop	< 15.0 (UJ)	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	< 15.0	NC	NC
Dinoseb	< 45.0 (UJ)	< 45.0	< 45.0	< 45.0	51.2	< 10.0	< 10.0	< 45.0	< 10.0	< 10.0	< 10.0	1,100,000	NC
MCPA	< 750 (UJ)	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	NC	NC
MCPP	< 750 (UJ)	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	< 750	NC	NC

a - Blind replicate of sample TP5-SS-01.

b - EPA Region 9 Preliminary Remedial Goals.

c - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

NC = No criteria exist for the associated analyte.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 9. PETROLEUM HYDROCARBONS IN SOIL SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (mg/kg)										
	SB1-SS-01	PW1-SS-01	TP1-SS-01	TP2-SS-01	TP4-SS-01	TP5-SS-01	TP6-SS-01	TP6-SS-02	TP7-SS-01	TP8-SS-01	TP9-SS-01 ^a
Hydrocarbon Identification (NWTPH-HCID)											
Diesel Range Hydrocarbons	< 50.0 (UJ)	< 50.0	< 50.0	< 50.0	< 50.0	50.0	< 50.0	< 50.0	< 50.0	< 50.0	50.0
Gx Range Hydrocarbons	< 20.0 (UJ)	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Heavy Fuel Oil Range Hydrocarbons	< 100 (UJ)	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Insulating Oil Range Hydrocarbons	< 100 (UJ)	< 100	100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Kerosene Range Hydrocarbons	< 50.0 (UJ)	< 50.0	< 50.0	< 50.0	< 50.0	50.0	< 50.0	< 50.0	< 50.0	< 50.0	50.0
Lube Oil Range Hydrocarbons	< 100 (UJ)	< 100	100	100	100	100	100	100	100	100	100
Diesel Range Hydrocarbons (NWTPH-Dx)											
Diesel Range Hydrocarbons	NA	NA	920	132	27.4	9,780	1,880	81.9	1,900	202	8,700
Lube Oil Range Hydrocarbons	NA	NA	2,360	342	136	20,200	4,040	533	2,790	951	31,400
Note: There are no federal or state ARARs associated with petroleum hydrocarbons.											
a - Blind duplicate of sample TP5-SS-01.											
UJ = Estimated as not detected above the laboratory reporting limit.											

associated EPA PRGs (19,000 µg/kg, 13,000 µg/kg, and 13,000 µg/kg, respectively), and the associated DEQ NSCLs (3,000 µg/kg, 2,000 µg/kg, and 2,000 µg/kg, respectively).

Polychlorinated Biphenyls--No PCBs were detected above laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area (Table 7).

Herbicides--No herbicide compounds were detected above laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area (Table 8).

Total Petroleum Hydrocarbons--Neither diesel nor heavy oil range TPH were detected above laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area (Table 9).

Metals--Leachate analyses revealed that seven of the 23 TAL metals were detected above the laboratory reporting limits in the surface soil sample collected downgradient of the pesticide mixing area, as shown on Table 4. The iron concentration of 8.81 mg/L detected in this sample exceeded the associated DEQ FCC of 1.0 mg/L. No other metals concentrations detected exceeded the applicable screening levels.

4.3.2 Subsoil Samples

The following section presents the analytical results of the subsoil samples collected at the landfill site. One sample, SB1-SS-01, was collected during well installation from boring SB1 (monitoring well location MW1) on the eastern edge of the landfill at a depth of 20 feet BLS in an attempt to evaluate the potential influence of landfill leachate on subsoil quality in this area. Poor soil recovery prevented the collection of additional subsoil samples from the remaining borings installed onsite. Sample SB1-SS-01 was analyzed for the presence of VOCs, SVOCs, pesticides, PCBs, herbicides, TPH, and TAL metals following SPLP extraction (Tables 4 through 9).

Nine additional subsoil samples, including one field replicate sample, were collected from seven of the eight test pits excavated onsite to evaluate the nature and extent of contamination within the landfill area. Consolidated slide block material was encountered at a depth of 2 feet BLS in test pit TP3, therefore no samples were collected from this boring. The nine test pit samples (denoted with a "TP"

prefix) were analyzed for the presence of VOCs, SVOCs, pesticides, PCBs, herbicides, and TPH (Tables 5 through 9). In addition, six of these nine samples, including the field replicate sample, were analyzed for the presence of total TAL metals, while the remaining three samples were analyzed for the presence of TAL metals following SPLP extraction (Tables 3 and 4). The corresponding sample locations are shown on Figure 5.

Volatile Organic Compounds--No VOCs were detected above laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 5). VOCs were detected above laboratory reporting limits in five of the nine subsoil samples collected from the test pit excavations onsite (Table 5). However, only the tetrachloroethene (PCE) concentrations of 2.12 mg/kg detected in sample TP7-SS-01 and 1.34 mg/kg detected in sample TP8-SS-01 exceed the applicable DEQ NSCL of 0.3 mg/kg.

Semi-volatile Organic Compounds--No SVOCs were detected above the laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 6). However, SVOC concentrations above the associated laboratory reporting limits were detected in four of the nine subsoil samples collected from the test pits excavated onsite; samples TP2-SS-01, TP4-SS-01, TP6-SS-01, and TP7-SS-01 (Table 6). Of the SVOCs detected, the concentrations of chrysene detected in these four samples exceeded the associated DEQ NSCL of 0.1 mg/kg. However, these concentrations did not exceed the associated EPA PRG of 360 mg/kg. In addition to these SVOCs, the following SVOC concentrations exceeded the specified screening levels.

- The concentrations of benzo(a)anthracene and benzo(b)fluoranthene detected in samples TP2-SS-01 and TP4-SS-01 exceeded the associated DEQ NSCLs, but not the EPA PRGs. The concentration of these compounds detected in samples TP6-SS-01 and TP7-SS-01 exceeded both the DEQ NSCLs and the EPA PRGs.
- The concentration of benzo(k)fluoranthene detected in sample TP2-SS-01 exceeded the DEQ NSCL but not the EPA PRG. The concentration of benzo(k)fluoranthene detected in sample TP7-SS-01 exceeded both the DEQ NSCL and the EPA PRG.
- The concentrations of benzo(a)pyrene detected in samples TP2-SS-01, TP6-SS-01, and TP7-SS-01, exceeded both the DEQ NSCL and the EPA PRG.

-
- The concentration of dibenz(a,h)anthracene detected in sample TP7-SS-01 exceeded both the DEQ NSCL and the EPA PRG.
 - The concentration of indeno(1,2,3-cd)pyrene detected in sample TP2-SS-01 exceeded the DEQ NSCL, but not the EPA PRG. However, the concentrations of indeno(1,2,3-cd)-pyrene detected in samples TP6-SS-01 and TP7-SS-01 exceeded both the DEQ NSCL and the EPA PRG.

Pesticides--Pesticides were not detected above the laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 7). However, pesticide concentrations above the associated laboratory reporting limits were detected in two of the nine test pit subsoil samples; samples TP1-SS-01 and TP7-SS-01 (Table 7). Of the analytes detected, the concentrations of 4,4'-DDD and 4,4'-DDT detected in sample TP1-SS-01 exceeded the associated DEQ NSCLs. In addition, the concentration of heptachlor epoxide detected in sample TP7-SS-01 also exceeded the associated DEQ NSCL, but not the associated EPA PRG.

Polychlorinated Biphenyls--No PCBs were detected above the laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 7). However, PCB Aroclor 1260 was detected in sample TP1-SS-01 at a concentration of 2,250 micrograms/kilogram ($\mu\text{g}/\text{kg}$), which exceeds both the DEQ NSCL and the EPA PRG associated with this compound (Table 7).

Herbicides--No herbicide compounds were detected above laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 8). The herbicide dinoseb was detected in sample TP4-SS-01 at a concentration of 51.2 $\mu\text{g}/\text{kg}$ (Table 8). There is no DEQ NSCL associated with this compound. However, this concentration is well under the EPA PRG of 1,100,000 $\mu\text{g}/\text{kg}$.

Total Petroleum Hydrocarbons--Neither diesel nor heavy oil range TPH were detected above laboratory reporting limits in the subsoil sample collected from boring SB1 (Table 9). However, both diesel and heavy oil range TPH were detected above laboratory reporting limits in the nine subsoil samples collected from the test pits excavated onsite (Table 9). There are no DEQ NSCLs or EPA PRGs associated with TPH in soil. The DEQ has developed a soil matrix to calculate site-specific

cleanup levels for petroleum hydrocarbons associated with underground storage tank sites (DEQ 1991). Regardless of the site specific matrix score, the maximum allowable concentration for diesel or heavier range TPH in soils under this matrix is 1,000 parts per million (ppm). The TPH concentrations detected in the samples collected from test pits TP1, TP5, TP6, TP7, and TP8 exceeded this maximum concentration.

Metals--Although leachable metals concentrations were detected above the associated laboratory reporting limits in the subsoil sample collected from boring SB1, the detected concentrations did not exceed the associated DEQ NSCLs (Table 4). In addition, the three test pit samples analyzed for the presence of leachable metals contained concentrations above the associated laboratory reporting limits. The concentrations of iron detected in these samples exceeded the associated DEQ FCC of 1.0 mg/L (Table 4).

Metals concentrations were also detected above the associated laboratory reporting limits in the six samples analyzed for the detection of total TAL metals (Table 3). Of the total metals concentrations detected, the arsenic concentrations reported for samples TP1-SS-01, TP5-SS-01, and TP8-SS-01 exceeded both the DEQ NSCL and the EPA PRG. However, the arsenic concentration of 3.04 mg/kg detected in sample TP5-SS-01 was less than that detected in background sample BK2-SS-01. In addition, the lead concentration detected in sample TP1-SS-01 exceeded both the DEQ NSCL and the EPA PRG and the lead concentration detected in sample TP6-SS-01 exceeded the EPA PRG, but did not exceed the DEQ NSCL.

4.3.3 Asbestos Samples

Three samples were collected, two from test pit TP1 and one from test pit TP8, of potentially asbestos containing building materials identified within the materials present in these test pits. These samples were delivered to EMSL Analytical, Incorporated of Seattle, Washington to be analyzed for the presence of asbestos. The two samples collected from test pit TP1 consisted of black roofing paper (sample ASB-01) and a silver mastic-type material attached to black roofing material (sample ASB-02). A concentration of 45 percent chrysotile fibers was detected in sample ASB-01. The laboratory separated the two materials present in sample ASB-02 and analyzed each individually. No asbestos fibers were identified in these samples during analysis. The third sample of potentially asbestos-containing building material, collected from test pit TP8 (sample ASB-03), consisted of dark gray

transite, or concrete/asbestos board. A concentration of 22 percent chrysotile fibers was detected in this sample. The presence of asbestos-containing materials (ACMs) in the landfill only becomes an issue with regard to worker safety during excavation activities. In these cases, the Occupational Safety and Health Administration (OSHA) has set a permissible exposure level (PEL) for airborne asbestos, expressed as an 8-hour time weighted average (TWA), of 0.2 fiber per cubic centimeter (0.2 fiber/cm³) of air. In addition, any excavation activities would potentially be subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), the Oregon hazardous air pollutant regulations [Oregon Administrative Rules (OAR) Chapter 340 Division 32], Oregon licensing and asbestos certification requirements (OAR Chapter 340 Division 33), and the Oregon hazardous substance remedial action rules (OAR Chapter 340 Division 122).

4.3.4 Groundwater Samples

The following section presents the analytical results of the groundwater samples collected in the vicinity of the landfill site. A total of four groundwater monitoring wells were installed onsite (see Figure 5). However, appreciable quantities of groundwater were only present in three of these four wells. The fourth well was installed to monitor potential seasonal changes in groundwater elevation. Four groundwater samples, including one field duplicate sample, were collected from these three monitoring wells. These samples were analyzed for the presence of VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, TPH, cyanide, and TAL metals. The analytical results of these groundwater samples are summarized on Tables 10 through 16.

Volatile Organic Compounds--VOCs were detected above laboratory reporting limits in three of the four groundwater samples collected at the landfill site (Table 10). The concentration of tetrachloroethene detected in the sample collected from well MW3 exceeded both the EPA PRG and the EPA maximum contaminant level (MCL). The DEQ has not established a numerical groundwater quality reference level (NGQRL) for tetrachloroethene.

Semi-volatile Organic Compounds--No SVOCs were detected above laboratory reporting limits in the four groundwater samples collected onsite (Table 11).

Pesticides--No pesticides were detected above laboratory reporting limits in the four groundwater samples collected onsite (Table 12).

TABLE 10. VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/l)				Applicable or Relevant and Appropriate Requirements (ARARs) (ug/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria ^b	DEQ Freshwater Chronic Criteria ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGQRL/ NGWCL) ^f
1,1,1,2-Tetrachloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.43	NC	NC
1,1,1-Trichloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	790	200	200
1,1,2,2-Tetrachloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	2,400	0.055	NC	NC
1,1,2-Trichloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	9,400	0.2	5	NC
1,1-Dichloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	810	NC	NC
1,1-Dichloroethene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.046	7	7
1,1-Dichloropropene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
1,2,3-Trichlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
1,2,3-Trichloropropane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.0016	NC	NC
1,2,4-Trichlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	190	70	NC
1,2,4-Trimethylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	12	NC	NC
1,2-Dibromo-3-chloropropane	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.048	0.2	NC
1,2-Dibromoethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.00075	NC	1
1,2-Dichlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	763	370	600	NC
1,2-Dichloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	20,000	0.12	5	5
1,2-Dichloropropane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.16	5	NC
1,3,5-Trimethylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	12	NC	NC
1,3-Dichlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	17	NC	NC
1,3-Dichloropropane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
1,4-Dichlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.47	75	75
2,2-Dichloropropane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
2-Butanone	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
2-Chlorotoluene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
2-Hexanone	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Chlorotoluene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
4-Methyl-2-pentanone	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
Acetone	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	610	NC	NC
Benzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.39	5	5
Bromobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	20	NC	NC
Bromochloromethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Bromodichloromethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.18	NC	NC
Bromoform	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	8.5	NC	NC
Bromomethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	8.7	NC	NC
Carbon disulfide	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1,000	NC	NC
Carbon tetrachloride	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.17	5	5
Chlorobenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	39	100	NC
Chloroethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Chloroform	< 1.00	< 1.00	< 1.00	< 1.00	NC	1,240	0.16	NC	NC
Chloromethane	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	1.5	NC	NC
cis-1,2-Dichloroethene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	70	NC
cis-1,3-Dichloropropene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Dibromochloromethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1	NC	NC
Dibromomethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Dichlorodifluoromethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	390	NC	NC
Ethylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1,300	700	700
Hexachlorobutadiene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	0.86	NC	NC
Isopropylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
m,p-Xylene	< 2.00	< 2.00	< 2.00	< 2.00	NC	NC	1,400	10,000	10,000
Methylene chloride	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	4.3	NC	NC
n-Butylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	61	NC	NC
n-Propylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	61	NC	NC
Naphthalene	< 1.00	< 1.00	< 1.00	< 1.00	NC	620	NC	NC	28
o-Xylene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1,400	10,000	10,000
p-Isopropyltoluene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
sec-Butylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	61	NC	NC
Styrene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1,600	100	NC
tert-Butylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	61	NC	NC
Tetrachloroethene	< 1.00	6.62	< 1.00	< 1.00	NC	NC	1.1	5	NC
Toluene	< 1.00	< 1.00	1.11	< 1.00	NC	NC	720	1,000	1,000
trans-1,2-Dichloroethene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	100	NC
trans-1,3-Dichloropropene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Trichloroethene	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	2	5	5
Trichlorofluoromethane	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	1,300	NC	NC
Vinyl chloride	< 1.00	< 1.00	< 1.00	< 1.00	NC	110	0.02	2	2

Note: Shading indicates that sample concentration exceeds ARARs. Laboratory reporting limits that exceed ARARs have not been shaded.

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)] and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 11. SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/l)				Applicable or Relevant and Appropriate Requirements (ARARs) (ug/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria ^b	DEQ Freshwater Chronic Criteria ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGRRL/ NGWCL) ^f
1,2,4-Trichlorobenzene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	190	70	NC
1,2-Dichlorobenzene	< 5.00	< 5.00	< 5.00	< 5.00	NC	763	370	600	NC
1,3-Dichlorobenzene	< 5.00	< 5.00	< 5.00	< 5.00	NC	763	17	NC	NC
1,4-Dichlorobenzene	< 5.00	< 5.00	< 5.00	< 5.00	NC	763	0.47	75	75
2,4,5-Trichlorophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	3,700	NC	NC
2,4,6-Trichlorophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	970	6.1	NC	NC
2,4-Dichlorophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	365	110	NC	NC
2,4-Dimethylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	730	NC	NC
2,4-Dinitrophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	73	NC	NC
2,4-Dinitrotoluene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	73	NC	NC
2,6-Dinitrotoluene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	37	NC	NC
2-Chloronaphthalene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
2-Chlorophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	2,000	38	NC	NC
2-Methylnaphthalene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
2-Methylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	1,800	NC	NC
2-Nitroaniline	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC	2.2	NC	NC
2-Nitrophenol	< 5.00	< 5.00	< 5.00	< 5.00	NC	150	NC	NC	NC
3-Methylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	1,800	NC	NC
4-Methylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	180	NC	NC
3,3'-Dichlorobenzidine	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC	0.15	NC	NC
3-Nitroaniline	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4,6-Dinitro-2-methylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Bromophenyl phenyl ether	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Chloro-3-methylphenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Chloroaniline	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	150	NC	NC
4-Chlorophenyl phenyl ether	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Nitroaniline	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
4-Nitrophenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	150	2,300	NC	NC
Acenaphthene	< 10.0	< 10.0	< 10.0	< 10.0	NC	520	28,000	NC	420
Acenaphthylene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
Aniline	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	12	NC	2,100
Anthracene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	1,800	NC	0.1
Benzo (a) anthracene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.092	NC	0.2
Benzo (a) pyrene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.0092	NC	NC
Benzo (b) fluoranthene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.092	NC	NC
Benzo (ghi) perylene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	NC	NC	NC
Benzo (k) fluoranthene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.92	NC	0.2
Benzoic Acid	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC	150,000	NC	0.2
Benzyl alcohol	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	11,000	NC	NC
Bis(2-chloroethoxy)methane	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
Bis(2-chloroethyl) ether	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	0.0098	NC	NC
Bis(2-chloroisopropyl) ether	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	0.27	NC	NC
Bis(2-ethylhexyl) phthalate	< 20.0	< 20.0	< 20.0	< 20.0	NC	NC	4.8	NC	NC
Butyl benzyl phthalate	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	7,300	NC	NC
Carbazole	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	3.4	NC	NC
Chrysene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	9.2	NC	0.2
Di-n-butyl phthalate	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	NC	NC	NC
Di-n-octyl phthalate	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	730	NC	NC
Dibenz (a,h) anthracene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.0092	NC	NC
Dibenzofuran	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	24	NC	NC
Diethyl phthalate	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	29,000	NC	NC
Dimethyl phthalate	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	370,000	NC	NC
Fluoranthene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	1,500	NC	280
Fluorene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	240	NC	280
Hexachlorobenzene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	0.042	1	NC
Hexachlorobutadiene	< 5.00	< 5.00	< 5.00	< 5.00	NC	9.3	0.86	NC	NC
Hexachlorocyclopentadiene	< 5.00	< 5.00	< 5.00	< 5.00	NC	5.2	260	50	NC
Hexachloroethane	< 10.0	< 10.0	< 10.0	< 10.0	NC	540	4.8	NC	NC
Indeno (1,2,3-cd) pyrene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	0.092	NC	0.4
Isophorone	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	71	NC	NC
N-Nitrosodi-n-propylamine	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	0.0096	NC	NC
N-Nitrosodiphenylamine	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	14	NC	NC
Naphthalene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	6.2	NC	28
Nitrobenzene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	3.4	NC	NC
Pentachlorophenol	< 10.0	< 10.0	< 10.0	< 10.0	13	13	0.56	1	NC
Phenanthrene	< 10.0	< 10.0	< 10.0	< 10.0	NC	NC	NC	NC	NC
Phenol	< 10.0	< 10.0	< 10.0	< 10.0	NC	2,560	22,000	NC	NC
Pyrene	< 5.00	< 5.00	< 5.00	< 5.00	NC	NC	180	NC	210

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)] and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 12. PESTICIDES IN GROUNDWATER SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/l)				Applicable or Relevant and Appropriate Requirements (ARARs) (ug/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria ^b	DEQ Freshwater Chronic Criteria ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGQRL/ NGWCL) ^f
4,4'-DDD	< 0.0400	< 0.0400	< 0.0400	< 0.0400	0.001	NC	NC	NC	NC
4,4'-DDE	< 0.0300	< 0.0300	< 0.0300	< 0.0300	NC	NC	NC	NC	NC
4,4'-DDT	< 0.270	< 0.270	< 0.270	< 0.270	NC	0.001	NC	NC	NC
Aldrin	< 0.0400	< 0.0400	< 0.0400	< 0.0400	NC	NC	0.004	NC	NC
alpha-BHC	< 0.0200	< 0.0200	< 0.0200	< 0.0200	NC	NC	0.011	NC	NC
alpha-Chlordane	< 0.0200	< 0.0200	< 0.0200	< 0.0200	NC	NC	NC	NC	NC
beta-BHC	< 0.0300	< 0.0300	< 0.0300	< 0.0300	NC	NC	0.037	NC	NC
Chlordane (tech)	< 0.150	< 0.150	< 0.150	< 0.150	0.0043	0.0043	0.19	2	NC
delta-BHC	< 0.0200	< 0.0200	< 0.0200	< 0.0200	NC	NC	NC	NC	NC
Dieldrin	< 0.0700	< 0.0700	< 0.0700	< 0.0700	0.0019	0.0019	0.042	NC	NC
Endosulfan I	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.056	0.056	220	NC	NC
Endosulfan II	< 0.0500	< 0.0500	< 0.0500	< 0.0500	0.056	0.056	220	NC	NC
Endosulfan sulfate	< 0.0700	< 0.0700	< 0.0700	< 0.0700	NC	NC	NC	NC	NC
Endrin	< 0.0800	< 0.0800	< 0.0800	< 0.0800	0.0023	0.0023	11	2	0.2
Endrin aldehyde	< 0.0800	< 0.0800	< 0.0800	< 0.0800	NC	NC	NC	NC	NC
gamma-BHC (Lindane)	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.08	NC	0.052	0.2	4
gamma-Chlordane	< 0.0200	< 0.0200	< 0.0200	< 0.0200	NC	NC	NC	NC	NC
Heptachlor	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.0038	0.0038	0.015	0.4	NC
Heptachlor epoxide	< 0.0300	< 0.0300	< 0.0300	< 0.0300	0.0038	NC	0.0074	0.2	NC
Methoxychlor	< 0.500	< 0.500	< 0.500	< 0.500	NC	0.03	180	40	100
Toxaphene	< 1.50	< 1.50	< 1.50	< 1.50	0.0002	0.0002	0.061	3	5

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)] and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 13. POLYCHLORINATED BIPHENYLS IN GROUNDWATER SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/l)				Applicable or Relevant and Appropriate Requirements (ARARs) (ug/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria (ug/l) ^b	DEQ Freshwater Chronic Criteria (ug/l) ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGQRL/NGWCL) ^f
Aroclor 1016	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	2.6	0.5	NC
Aroclor 1221	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.034	0.5	NC
Aroclor 1232	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.034	0.5	NC
Aroclor 1242	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.034	0.5	NC
Aroclor 1248	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.034	0.5	NC
Aroclor 1254	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.73	0.5	NC
Aroclor 1260	< 0.100	< 0.100	< 0.100	< 0.100	0.014	0.014	0.034	0.5	NC
Aroclor 1262	< 0.100	< 0.100	< 0.100	< 0.100	NC	0.014	0.034	0.5	NC
Aroclor 1268	< 0.100	< 0.100	< 0.100	< 0.100	NC	0.014	0.034	0.5	NC

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)] and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 14. HERBICIDES IN GROUNDWATER SAMPLES
SITE INSPECTION
BRADFORD ISLAND LANDFILL
CASCADE LOCKS, OREGON
AUGUST 1998

Target Analyte	Sample Designation (ug/l)				Applicable or Relevant and Appropriate Requirements (ARARs) (ug/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria ^b	DEQ Freshwater Chronic Criteria ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGQRL/ NGWCL) ^f
2,4,5-T	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
2,4,5-TP (Silvex)	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	50	10
2,4-D	< 0.500	< 0.500	< 0.500	< 0.500	NC	NC	370	70	100
2,4-DB	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	290	NC	NC
Dalapon	< 1.50	< 1.50	< 1.50	< 1.50	NC	NC	1,100	200	NC
Dicamba	< 0.500	< 0.500	< 0.500	< 0.500	NC	NC	1,100	NC	NC
Dichlorprop	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	NC	NC	NC
Dinoseb	< 1.00	< 1.00	< 1.00	< 1.00	NC	NC	37	7	NC
MCPA	< 50.0	< 50.0	< 50.0	< 50.0	NC	NC	NC	NC	NC
MCPP	< 50.0	< 50.0	< 50.0	< 50.0	NC	NC	NC	NC	NC

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)] and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 15. METALS IN GROUNDWATER SAMPLES
 SITE INSPECTION
 BRADFORD ISLAND LANDFILL
 CASCADE LOCKS, OREGON
 AUGUST 1998

Target Analyte	Sample Designation (mg/l)				Applicable or Relevant and Appropriate Requirements (mg/l)				
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a	EPA Freshwater Chronic Criteria ^b	DEQ Freshwater Chronic Criteria ^c	EPA (PRGs) ^d	EPA (MCLs) ^e	DEQ (NGQRL/ NGWCL) ^f
Silver	< 0.00100	< 0.00100	< 0.00100	< 0.00100	NC	0.00012	0.18	NC	0.05
Arsenic	0.00808	< 0.00100	0.00228	0.00261	0.19	NC	0.000045	0.05	0.05
Barium	0.128	0.0233	0.264	0.249	NC	NC	2.6	2	1
Beryllium	< 0.00100	< 0.00100	< 0.00100	< 0.00100	NC	0.0053	0.073	0.004	NC
Calcium	4.51 (J)	20.7 (J)	72.6 (J)	72.9 (J)	NC	NC	NC	NC	NC
Cadmium	< 0.00100	< 0.00100	< 0.00100	< 0.00100	0.001	0.0011	0.018	0.005	0.01
Cobalt	0.00163	< 0.00100	0.00553	0.00562	NC	NC	2.2	NC	NC
Chromium	0.00351	0.00111	0.0035	0.00345	NC	NC	NC	0.1	0.05
Copper	0.00567	0.00185	0.00761	0.00730	0.011	0.012	1.4	1.3	NC
Cyanide (total)	< 0.0100	< 0.0100	< 0.0100	< 0.0100	0.0052	0.0052	0.73	0.2	NC
Iron	4.34	< 0.150	11	8.88	NC	1	11	NC	NC
Mercury	< 0.00100	< 0.00100	< 0.00100	< 0.00100	0.000012	0.000012	NC	0.002	0.002
Potassium	5.15	1.54	4.7	4.91	NC	NC	NC	NC	NC
Magnesium	1.17	6.49	16.4	16.7	NC	NC	NC	NC	NC
Manganese	0.0987	0.348	2.49	2.68	NC	NC	1.7	NC	NC
Sodium	49.2	5.89	9.26	10.3	NC	NC	NC	NC	NC
Nickel	0.00246	0.00247	0.00939	0.00902	0.16	0.16	0.73	NC	NC
Lead	0.00771	< 0.00100	0.0123	0.0108	0.0025	0.0032	0.004	0.015	0.05
Antimony	0.00108	< 0.00100	< 0.00100	< 0.00100	NC	1.6	0.015	0.006	NC
Selenium	0.00148	< 0.00100	< 0.00100	< 0.00100	0.005	0.035	0.18	0.05	0.01
Thallium	< 0.00100	< 0.00100	< 0.00100	< 0.00100	NC	0.04	NC	0.002	NC
Vanadium	0.0119	< 0.00100	0.00691	0.00663	NC	NC	0.26	NC	NC
Zinc	0.0268	< 0.0100	0.0237	0.0238	0.1	0.11	11	NC	NC
Aluminum	3.48	0.107	1.46	1.63	NC	NC	37	NC	NC

Note: Shading indicates that sample concentration exceeds ARARs. Laboratory reporting limits that exceed ARARs have not been shaded.

a - Blind duplicate of sample MW4-GW-01.

b - U.S. EPA criteria for priority toxic pollutants for freshwater [Criterion Continuous Concentration (40 CFR, Chapter 1, Part 131, Section 36 (b)(1))].

c - Oregon Administrative Rules, Chapter 340, Division 41, Table 20.

d - DEQ numerical soil cleanup levels (OAR Chapter 340-122-045).

e - EPA Region 9 Preliminary Remedial Goals.

f - Oregon Department of Environmental Quality (DEQ) numerical groundwater cleanup levels [OAR Chapter 340-122-242(4)]
and numerical groundwater quality reference levels (OAR Chapter 340-040-0020).

NC = No criteria exist for the associated analyte.

J = Estimated concentration.

UJ = Estimated as not detected above the laboratory reporting limit.

TABLE 16. PETROLEUM HYDROCARBONS IN GROUNDWATER SAMPLES SITE INSPECTION BRADFORD ISLAND LANDFILL CASCADE LOCKS, OREGON AUGUST 1998				
Target Analyte	Sample Designation (mg/l)			
	MW2-GW-01	MW3-GW-01	MW4-GW-01	MW5-GW-01 ^a
Hydrocarbon Identification (NWTPH-HCID)				
Diesel Range Hydrocarbons	< 0.630	< 0.630	< 0.630	< 0.630
Gx Range Hydrocarbons	< 0.250	< 0.250	< 0.250	< 0.250
Heavy Fuel Oil Range Hydrocarbons	< 0.630	< 0.630	< 0.630	< 0.630
Insulating Oil Range Hydrocarbons	< 0.630	< 0.630	< 0.630	< 0.630
Kerosene Range Hydrocarbons	< 0.630	< 0.630	< 0.630	< 0.630
Lube Oil Range Hydrocarbons	< 0.630	< 0.630	< 0.630	< 0.630
Gasoline Range Hydrocarbons (NWTPH-Gx)				
Gasoline Range Hydrocarbons	< 50.0	< 50.0	< 50.0	< 50.0
Diesel Range Hydrocarbons (NWTPH-Dx)				
Diesel Range Hydrocarbons	0.502	< 0.250	0.332	0.340
Lube Oil Range Hydrocarbons	< 0.500	< 0.500	< 0.500	< 0.500
Note: There are no federal or state ARARs associated with petroleum hydrocarbons. a - Blind duplicate of sample MW4-GW-01. J = Estimated concentration. UJ = Estimated as not detected above the laboratory reporting limit.				

Polychlorinated Biphenyls--No PCBs were detected above laboratory reporting limits in the four groundwater samples collected onsite (Table 13).

Herbicides--No herbicide compounds were detected above laboratory reporting limits in the four groundwater samples collected onsite (Table 14).

Cyanide--Cyanide was not detected above laboratory reporting limits in the four groundwater samples collected onsite (Table 15).

Metals--TAL metals concentrations were above laboratory reporting limits in all four of the groundwater samples collected at the site (see Table 15). Of the TAL metals concentrations detected, the concentration of arsenic detected in the samples collected from wells MW2 and MW4 exceeded their corresponding EPA PRGs, but did not exceed the EPA MCLs or the DEQ NGQRLs. The concentrations of iron detected in the samples collected from wells MW2 and MW4 exceeded the associated DEQ FCC of 1.0 mg/L. Neither an EPA MCL or a DEQ NGQRL has been established for manganese. However, the manganese concentration detected in the samples collected from well MW4 exceeded the associated EPA PRG. In addition, the concentrations of lead detected in the samples collected from well MW4 exceeded both the associated DEQ FCC and the EPA PRG.

Total Petroleum Hydrocarbons--Heavy oil range TPH was not detected above the laboratory detection limits in the groundwater samples collected at the site. However, diesel range TPH was detected above the laboratory detection limit in the groundwater sample collected from well MW2 at concentrations of 0.502 milligrams/liter (mg/L), and the two samples collected from MW4 at concentrations of 0.332 mg/L and 0.340 mg/L (Table 16). No EPA PRGs, EPA MCLs, or DEQ NGQRLs have been established for petroleum hydrocarbons in water. However, the Oregon DEQ has established a risk-based approach to evaluate sites with petroleum hydrocarbons present in groundwater, based on the presence of the more hazardous constituents typically present in petroleum hydrocarbons; specifically BTEX and PAHs. Neither BTEX nor PAH compounds were detected above the laboratory reporting limits in any of the groundwater samples collected at the site.

4.4 LANDFILL VOLUME ESTIMATE

During test pit excavation at the landfill site, waste materials were encountered throughout some test pits, while other test pits contained waste materials in discrete horizons. Therefore, the landfill likely developed as a result of disposal in discrete areas rather than continuous lateral placement. However, conservative estimates of the aerial extent of the landfill and the volume of material buried within the landfill have been developed based on the test pit observations, the presence of elevated TPH concentrations in samples collected from the test pits, and the assumption that the landfill is laterally continuous rather than discontinuous. Therefore, the landfill is estimated to cover an area of approximately 0.5 acres, based on elevated TPH concentrations present in test pit samples. Given that waste materials continued to be present at the maximum excavation depths in some test pits, approximately 5 feet of depth has been added in these areas to estimate the volume of waste present. Therefore, the depths to which the wastes within the landfill extend are estimated to range from approximately 8 to 16 feet BLS. Accordingly, approximately 8,800 cubic yards of material are estimated to be present within the landfill site. The cross-sections and calculations used to derive these estimates are presented in Appendix J.

4.5 DATA QUALITY ASSURANCE/QUALITY CONTROL EVALUATION

The following section provides a summary of the analytical results associated with the field quality control samples collected during the landfill site inspection. An analytical data quality evaluation report that provides a more detailed quality assurance/quality control review of the entire laboratory data package is presented in Appendix I. Field quality control samples collected during the site inspection included field duplicate samples associated with both the soil and groundwater samples, and a trip blank sample associated with the groundwater samples.

4.5.1 Field Duplicate Samples

Two field duplicate samples, one soil and one groundwater, were collected during the landfill site inspection. A discussion of the relative percent differences (RPDs) between these duplicate samples is included in the data quality evaluation report presented in Appendix I. Based on this data quality

evaluation, the RPDs calculated for these field duplicate samples were in agreement according to COE specified criteria (COE-CRERL 1996).

4.5.2 Trip Blank Sample

One trip blank sample was analyzed for the detection of VOCs during the landfill site inspection. Carbon disulfide and methylene chloride were detected above their associated laboratory reporting limits in this sample. However, methylene chloride was also detected in the associated method blank and is considered a common laboratory artifact, and carbon disulfide was not detected in any of the environmental samples collected at the site. Therefore, no qualification of the associated sample data was deemed necessary.

SECTION 5.0

SUMMARY AND CONCLUSIONS

The following sections summarize the field activities performed during the landfill site inspection, and the results of these field activities by area of concern. Also included is a discussion of the analytical results of the surface soil, subsoil, asbestos, and groundwater samples collected onsite in relation to the identified screening levels. In addition, recommendations have been provided for further site investigation and/or remediation activities, as appropriate.

5.1 PROJECT BACKGROUND

The Bradford Island landfill site inspection field activities were conducted in two phases. The first phase of field work, from August 17, 1998 through August 20, 1998, included the collection of four surface soil and 10 subsoil samples. Three of the four surface soil samples were collected in background locations outside the landfill area to determine background metal concentrations on Bradford Island. The fourth surface soil sample was collected downgradient of the pesticide mixing area to determine if residual pesticides had adversely impacted the environment as a result of past practices in this area. Nine of the 10 subsoil samples, including one field replicate sample, were collected from the eight test pits excavated at the site to define the western boundary of the former landfill, and the exact locations of the disposal pits identified in prior interviews with Project personnel. In addition, three samples of building materials thought to potentially contain asbestos were collected from these test pits to determine if past disposal practices could pose a threat to human health. One additional subsoil sample was collected from one of the five soil borings drilled onsite using hollow stem auger techniques. Groundwater monitoring wells were installed in four of these five borings and these wells were also developed during this first phase of fieldwork. In addition, the elevation and horizontal coordinates of each sample location and each monitoring well were surveyed.

The second phase of fieldwork, conducted September 1 and 2, 1998, included the collection of four groundwater samples from three of the groundwater monitoring wells installed onsite to determine if

past disposal practices had adversely impacted groundwater in the landfill area. In addition, a visual survey was conducted of the island for the presence of groundwater seeps to determine if precipitation that infiltrates the fill materials in the vicinity of the former landfill migrates horizontally along the fill-slide block interface and enters the Columbia River via groundwater seeps. An attempt was also made to collect sediment samples from the Columbia River adjacent to the landfill site to determine if past disposal practices had adversely impacted the environment and/or could pose a threat to human health or ecological resources. However, multiple sampling attempts were made at each of the potential areas of concern; including the area north of the landfill site and the area east of the landfill, from just off the shore of the island to near mid-channel, and no sediment could be obtained due to scouring and the composition of the remaining river bed materials.

All soil and groundwater samples were submitted to North Creek Analytical Laboratory in Bothell, Washington, for analysis. Project QA split samples were delivered to the COE, Chemical Quality Assurance Branch Laboratory in Omaha, Nebraska for analysis.

The specific analyses performed on samples collected from each area of investigation have been summarized on Table 2. These analyses were selected based on past waste disposal activities as reported in background information reviewed in preparation for the site inspection.

5.2 PESTICIDE MIXING AREA

Although the surface soil sample collected downgradient of the pesticide mixing area contained detectable concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, these concentrations did not exceed either the EPA PRGs or the DEQ NSCLs for these compounds. Seven of the 23 TAL metals analyzed following SPLP extraction were also detected above the laboratory reporting limits. However, none of these concentrations exceeded applicable EPA or DEQ screening levels. In addition, no VOC, SVOC, PCB, chlorinated herbicide, or TPH constituents were detected above laboratory reporting limits in the surface soil sample collected in this area.

5.3 LANDFILL SITE

Samples collected within the landfill site included 10 subsoil samples, three building material samples, and four groundwater samples. One subsoil sample was collected from one of the five soil borings drilled onsite during well installation activities using hollow stem auger drilling techniques. Contaminant concentrations exceeding applicable EPA and DEQ screening levels were not detected in this subsoil sample.

Nine of these subsoil samples, including one replicate soil sample, were collected from seven of the eight test pits excavated in and around the landfill site. TPH concentrations were detected above laboratory reporting limits in all nine of these samples. No EPA PRGs or DEQ NSCLs have been established for TPH concentrations. However, the TPH concentrations detected in the soil samples collected from test pits TP1, TP5, TP6, TP7, and TP8 exceeded the maximum allowable concentration established by DEQ for diesel or heavier range TPH in soils at underground storage tank sites of 1,000 ppm (DEQ 1991).

Pesticides concentrations exceeding DEQ NSCLs were detected in the samples collected from test pits TP1 and TP7. However, these concentrations did not exceed the associated EPA PRGs. The sample collected from test pit TP1 also contained a PCB concentration that exceeded both the EPA PRG and the DEQ NSCL. The sample collected from test pit TP4 contained a dinoseb concentration above the laboratory reporting limit. However, the concentration detected did not exceed the EPA PRG and the DEQ has not established a NSCL for dinoseb. Tetrachloroethene concentrations exceeding the DEQ NSCL were detected in the samples collected from test pits TP7 and TP8. However, these concentrations did not exceed the EPA PRGs established for these compounds. SVOC concentrations exceeding both the DEQ NSCLs and the EPA PRGs were detected in the samples collected from test pits TP2, TP6, and TP7. In addition, SVOC concentrations exceeding only the DEQ NSCLs were detected in the sample collected from test pit TP4. Total arsenic and lead concentrations exceeding both the DEQ NSCLs and the EPA PRGs were detected in the samples collected from test pits TP1, TP5, TP6, and TP8. Arsenic was also detected at a concentration slightly exceeding the associated screening levels in one of the three background soil samples. The concentration of arsenic detected in the sample collected from test pit TP1 was present at a concentration which was three times the screening level. Therefore, contaminant concentrations exceeding applicable screening levels are

present in all of the soil samples collected from the test pits within the landfill, indicating that the soil within these areas of the landfill has been adversely impacted by past practices.

Four groundwater samples, including one duplicate sample, were collected from three of the four monitoring wells installed. The fourth well, MW1, did not contain water and was therefore not sampled. Arsenic, lead, and manganese concentrations exceeding only the EPA PRGs were detected in the groundwater samples collected from wells MW2 and MW4. In addition, a tetrachloroethene concentration exceeding both the EPA PRG and the EPA MCL was detected in the sample collected from well MW3. This indicates that the materials disposed within the landfill boundaries have adversely impacted the shallow groundwater beneath the landfill in a localized area. However, this groundwater appears to be laterally discontinuous. No groundwater seeps were identified during the seep survey performed onsite and there are no groundwater supply wells present on Bradford Island.

Three samples of building materials thought to potentially contain asbestos were collected from the waste materials present in two of the eight test pits, TP1 and TP8. Two of these three samples contained asbestos. The black roofing paper collected from test pit TP1 contained 45 percent chrysotile fibers and the cement-asbestos board collected from test pit TP8 contained 22 percent chrysotile fibers. Given that these building materials are buried, they do not currently pose a threat to human health. However, the presence of these materials would become a consideration during any removal action proposed onsite. Measures would need to be taken to ensure that these materials do not become friable and release fibers during removal.

5.4 COLUMBIA RIVER

Two areas of concern with regard to sediment quality were identified adjacent to and on the banks of the Columbia River east and north of the Bradford Island landfill site. These areas were reportedly used for storage and disposal of various waste products. However, multiple attempts to collect sediment in each of these areas met with no success. The attempted sampling locations spanned from near shore to almost mid-channel. Due to the composition of riverbed materials, when the sampler was retrieved it was either empty or contained only cobble-size materials. These results, along with the proximity of Bonneville Dam and the fact that the dam spillway had been open prior to these sampling

attempts indicate that the area surrounding the island is a scour zone. The dam spillway is opened yearly from mid-April through late-August on a 24-hour a day basis to facilitate juvenile fish passage (Johnson, J., 3 November, 1998, personal communication). In addition, the spillway is opened during flood events when the river flow rate exceeds 280,000 cubic feet per minute.

A visual survey of the island for the presence of groundwater seeps was also conducted on 2 September 1998 from a boat using binoculars, to determine if leachate from the former landfill was migrating to the Columbia River via groundwater seeps. The sloped banks of Bradford Island, from the change in slope near the locked gate on the north to the southeastern corner of the island, were carefully examined for any signs of seepage. No groundwater seeps were identified during this survey.

5.5 CONCLUSIONS AND RECOMMENDATIONS

Of the four areas of concern identified at the Bradford Island landfill site, the greatest potential risk to human health and the environment is posed by the waste materials and associated soil contamination present within the landfill. The soil in the discrete disposal areas contains elevated concentrations of TPH, in addition to concentrations of pesticides, the PCB Aroclor 1260, tetrachloroethene, SVOCs, arsenic, and lead that exceed their associated risk-based screening levels.

However, additional information is necessary to evaluate the impacts of past waste handling and disposal practices at the landfill site, and to allow an effective evaluation of remedial alternatives. Therefore, Tetra Tech recommends that the following additional investigation activities be performed at the landfill site:

- Conduct a geophysical survey of the landfill site and the Columbia River immediately adjacent to the east end of the island, to better define areas of waste disposal.
- Perform quarterly groundwater level monitoring of the monitoring wells and piezometers installed onsite, at a minimum, and collect at least one additional set of groundwater samples from the monitoring wells following seasonal occurrence of

sustained, higher precipitation (i.e., early spring), to characterize the affect of seasonal groundwater fluctuations on contaminant concentrations, and the groundwater gradient.

- Perform at least one additional seep survey during annual periods of high precipitation, to determine if the shallow groundwater at the landfill site is entering the Columbia River via seepage and overland flow. Given the schedule of water releases over the spillway of the dam, early April would be the latest that this survey could be completed.
- Collect samples of the IDWs generated during the site inspection to determine the disposal options available for these wastes. These samples should be analyzed for the presence of Resource Conservation and Recovery Act (RCRA) metals using the toxicity characteristic leaching procedure (TCLP) to determine if these IDWs are listed hazardous wastes under the RCRA regulations. In addition, the IDWs should be analyzed for the constituents required for characterization by the disposal facility selected.
- Conduct a geotechnical evaluation of the landfill site to determine slope stability and erosion potential.
- Collect additional soil samples in the pesticide mixing area to determine if this area has been adversely impacted by past material handling practices.
- Collect surface soil samples in the pesticide mixing and landfill site to evaluate potential risks to human and environmental receptors.
- Find and properly abandon the piezometer identified as DH 2002Z reportedly buried within the landfill to comply with the requirements of OAR Chapter 690, Division 240.

The information obtained by conducting these additional activities can then be used to conduct an ecological risk assessment, and to evaluate the feasibility and cost effectiveness of a comprehensive range of remedial options, including, but not limited to, no action, capping, removal actions, limited removal actions with capping, onsite treatment technologies, or in-situ treatment technologies.

SECTION 6.0 REFERENCES

Johnson, J. 3 November 1998. Personal communication (Telephone conversation with Ms. Carlotta Cellucci). U.S. Army Corps of Engineers, Portland District, Portland, Oregon.

Oregon Department of Environmental Quality. 1996. Northwest Total Petroleum Hydrocarbon Analytical Methods. Prepared and published jointly by the Oregon Department of Environmental Quality and the Washington State Department of Ecology, December 1996.

Oregon Department of Environmental Quality. 1991. UST Cleanup Manual [including Cleanup Rules for Leaking Petroleum Underground Storage Tank Systems (OAR 340-122-205 through 260) and Numeric Soil Cleanup Levels for Motor Fuel and Heating Oil (OAR 340-122-305 through 360)]. DEQ, Portland, Oregon.

Stampe, W. L. 1996. Memorandum for Chief, CENPP-CO. Subject: Bonneville Lock and Dam, Suspected Dump Site, Bradford Island. Operations Project Manager, Bonneville Lock and Dam, Cascade Locks, Oregon.

Tetra Tech. 1998a. Final Work Plan, Bradford Island Former Landfill Site, Cascade Locks, Oregon. Prepared for U.S. Army Corps of Engineers, Portland District. Contract No. DACW57-96-D-0009, Task No. 10. Tetra Tech, Inc., Seattle, Washington.

Tetra Tech. 1998b. Accident Prevention Plan, Bradford Island Former Landfill Site, Cascade Locks, Oregon. Prepared for U.S. Army Corps of Engineers, Portland District. Contract No. DACW57-96-D-0009, Task No. 10. Tetra Tech, Inc., Seattle, Washington.

U.S. Army Corps of Engineers. 1996. Chemical Data Quality Assurance Guidance for Hazardous, Toxic, and Radioactive Waste Sites. Engineering Manual 200-1-6.

U.S. Army Corps of Engineers. 1998. Memorandum for Record. Geology of Bradford Island. Prepared by Clarence E. Keech, PE-GG. Prepared for Input Into Site Inspection Report.

U.S. Army Corps of Engineers Cold Regions and Environmental Research Laboratory. 1996. Comparison Criteria for Environmental Chemical Analyses of Split Samples Sent to Different Laboratories - Corps of Engineers Archived Data. CRREL Special Report No. 96-9 prepared by Grant, C.G., Jenkins, T.F., and Mudambi, A.R.

U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes, EPA Manual, 600/4-79-020.

U.S. Environmental Protection Agency. 1987. Data Quality Objectives for Remedial Response Activities, Development Process. EPA/540/G-87/003 (OSWER Directive 9355-0-7B).

U.S. Environmental Protection Agency. 1994. U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. Office of Solid Waste and Emergency Response. Publication EPA-540/R-94-013. February.

U.S. Environmental Protection Agency. 1994. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. Office of Emergency and Remedial Response. Publication EPA 540/R-94/012. February.

U.S. Environmental Protection Agency. 1996. Test Methods for Evaluation of Solid Waste. Publication SW-846. Third Edition, Revision 4. December 1996.

U.S. Geological Survey. 1979. Bonneville Dam, Wash.-Oreg. 7.5 Minute Series. (N4537.5 - W12152.5/7.5). USGS, Denver, Colorado.

APPENDIX A

PERSONNEL INTERVIEWS AND AERIAL PHOTOGRAPH REVIEW

CENPP-CO-B

21 March 1996

Markos/jab/791-233

MEMORANDUM FOR Chief, CENPP-CO

SUBJECT: Bonneville Lock and Dam, Suspected Dump Site, Bradford Island.

1. We believe there are a number of areas containing hazardous constituents located at the northeast section of Bradford Island. This supposition is based on interviews and site visits conducted by the Project Environmental Compliance Coordinator with five Corps employees familiar with past work practices, one of whom worked at the Project from 1948 to 1983. All five individuals advised past work practices had included the disposal of Project waste at particular areas of northeast Bradford Island. There are also two additional areas at Bradford Island suspected to contain hazardous constituents.

2. Requirements: 40 CFR 300.405 and OAR 340-122.

3. Based on these interviews, we believe dumping occurred on the northeast section Bradford Island for approximately forty (40) years and ceased in the early 1980s. As sites were filled, others were created and it is unknown how long disposal occurred at each site. The persons interviewed gave similar descriptions of disposal locations and their possible contents. The attached map shows the suspected disposal areas and their contents. The following are wastes believed to be located at the Bradford Island Site.

a. Site 1: General household garbage pit. General household garbage was disposed in this pit and was burned monthly.

b. Site 2a, b, c, d: Trash Pits. The pits were excavated with a back hoe. Dimensions are believed to be approximately 10x10x10 and were filled with mercury vapor lamps, oil and grease from turbines, grease from wicket and spill gates, and paint-related waste including solvents.

c. Site 3: Grease from spillway gate wheels. Grease was stored in five (5) gallon buckets and discarded along the Columbia river bank. It is not known how many buckets were discarded.

d. Site 4: Pesticides. This area was used for mixing pesticides. It was also used to rinse articles containing pesticides.


e. Site 5: Switch gear and various cables dumped over the Columbia river bank.

f. Site 6: (Additional area) This area contains abrasive blast grit which was used as fill material. The grit is suspected to be contaminated with lead paint. In addition, soil analysis conducted in December 1995 indicated levels of petroleum requiring remediation.

g. Site 7: (Additional area) This area has been used to store scrap metal. Sections of the site are stained with oil. Some of the metal hardware included pipes with lead paint, pneumatic and hydraulic equipment and insulators which possibly held residual PCB oil.

4. . Based on the hazardous substance disposal history, we propose to conduct an environmental investigation of these sites beginning fiscal year 1998. This will begin with the development of a site characterization plan to assess media contamination including soil and water.

5. Should you have further questions on the status of this matter, please contact me at (541) 374-8442.

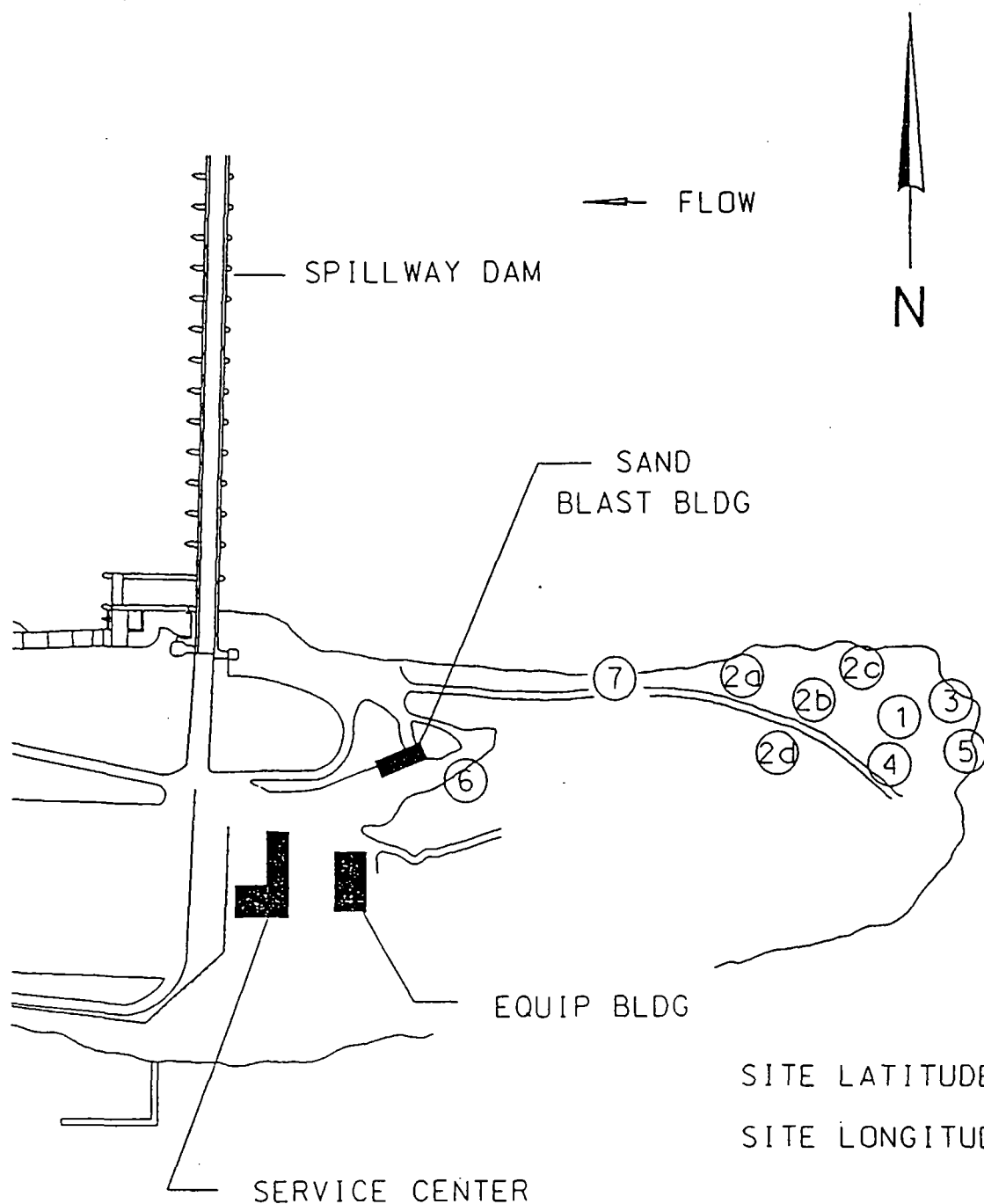

WADE L. STAMPE
Operations Project Manager

BONNEVILLE LOCK AND DAM HISTORICAL DISPOSAL SITE

CASCADE LOCKS, OREGON

NORTHEAST SECTION OF BRADFORD ISLAND

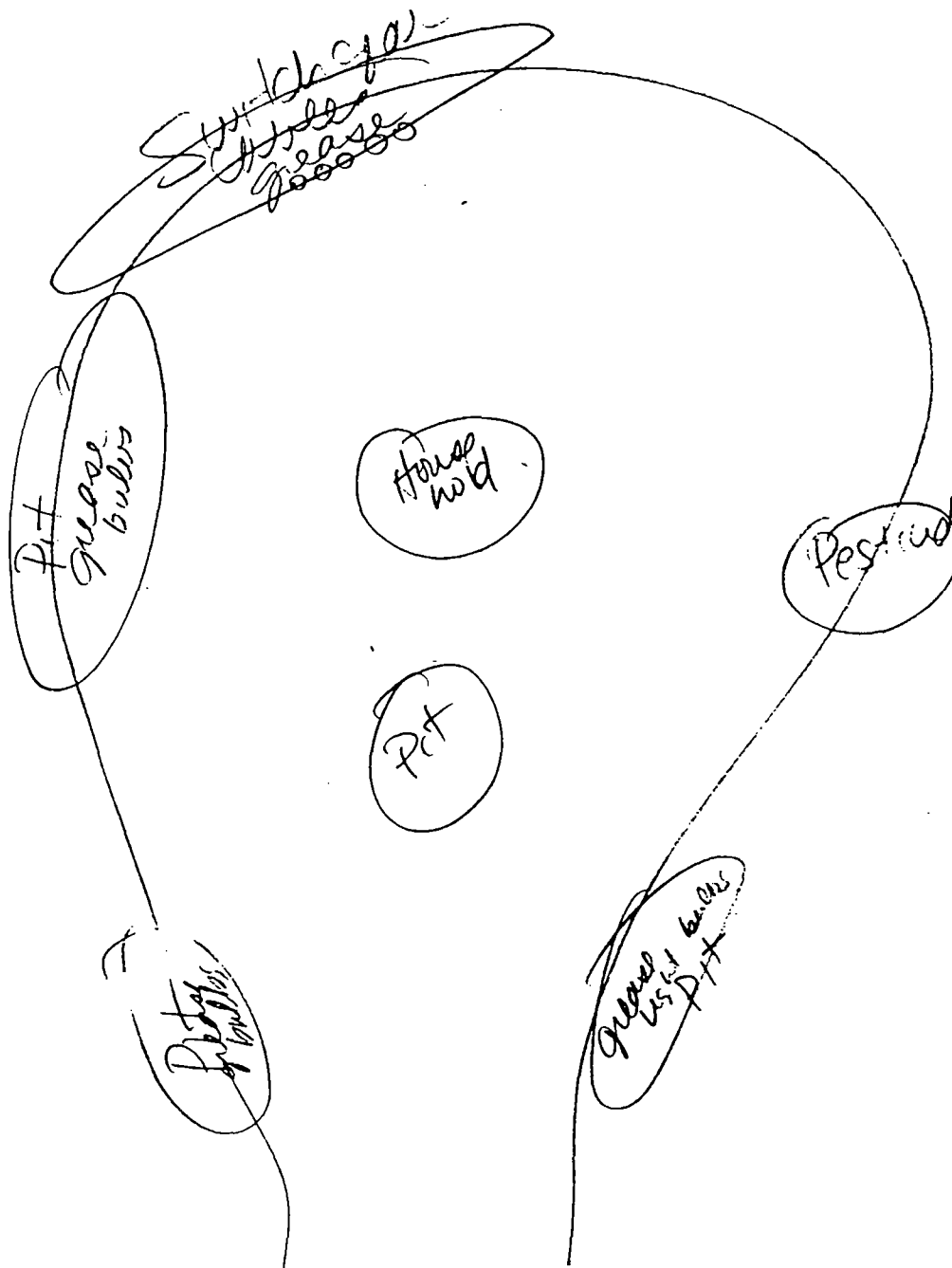
FEBRUARY 26, 1996



SITE LATITUDE N45°-38'33.5"

SITE LONGITUDE W121°-56'02.2"

MASTER map
Combination of all interviews



Steve C.

2/6/95

- Trash/garbage - burned weekly
- glass pits, grease + oil from turbine pits, possibly solvents
- pesticide residue

Stopped dumping in pits in 1986
Dump closed in early 1970

Ben
- 50 yrs of dumping
- most close to edge
- about 20 or so houses
1979 began work

Sept 19, 1995

dug back hoe 2 wood plank. + top down

Pit = ~~made of wood~~ 10X10X10

Project
garbage - steel
cable dump into river

Wicker gate from
grease. 50
solvents

Project + Housing
Dump Garbage
from project
burned it monthly
knowing pulled
out 1982

Wash rack area
= pipe-H₂O

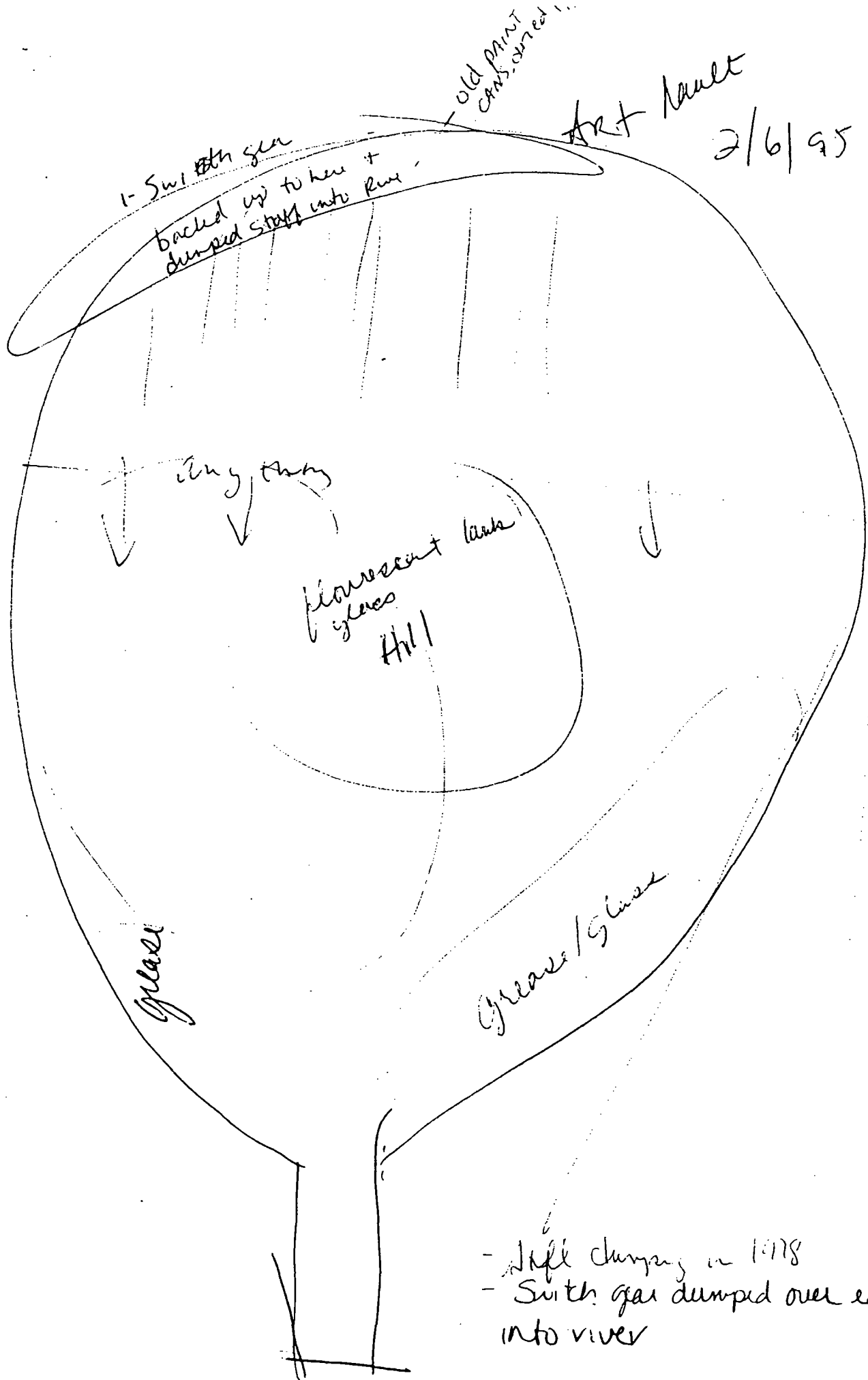
Pesticide
mixed
+ washed out
tanks

Paints

Solvents
butane
Flammable
with the gate pit
oil
grease, and
leaked oil

Oil
leaked oil
Pit
leaked oil

There is fill now



- Still dumping in 1978
- Smith gear dumped over edge into river

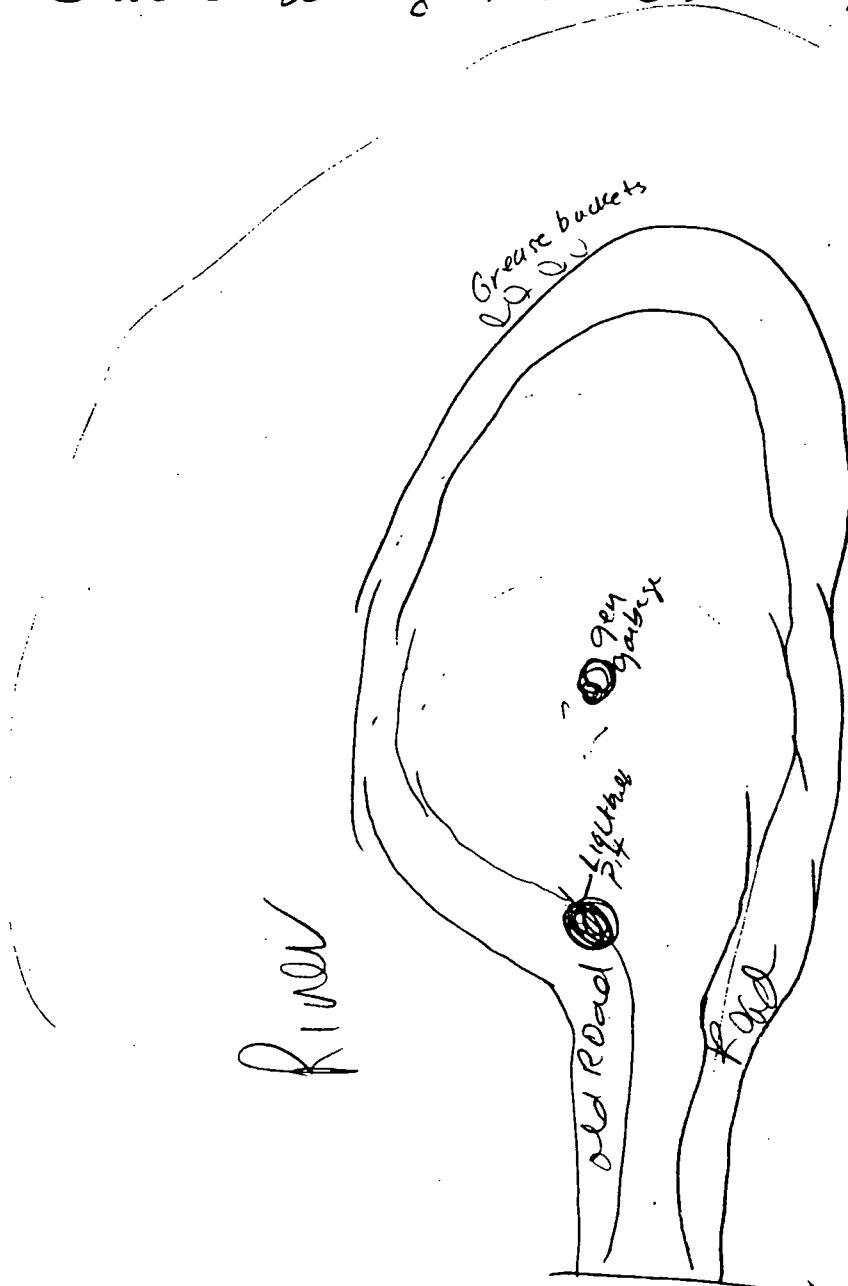
Andy DeBriac

Sept. 19, 1995

Seen up on the pump 17 yrs
in South Bonnevile

Light bulb pit - trap door Mercury ~~to~~ Vapor
Basic household garbage - from South Bonnevile

stored 5 gal drums grease from Spillway gate wheels
+ Stacked along river bank 1980s - thrown over bank



Bolton, Jane M NWP

From: Markos, Carolyn S NWP
Sent: Wednesday, April 08, 1998 1:09 PM
To: Bolton, Jane M NWP
Cc: Chenoweth, Deborah L NWP; Shank, David C NWP; McCavitt, Brian M NWP
Subject: Boat Survey - Bradford Island

Jane,

This is a response to your inquiry about the results of a pool survey I conducted on 9 October 1996. The purpose of the survey was to make a general visual assessment of potential contamination and/or migration of contaminants from North East Bradford Island. The Bonneville forebay was dropped to approximately 72 feet for this boat survey. Along the shoreline of both the north and east facing sections of Bradford Island, I observed numerous cables (possibly switch gear cables). I did not observe any sheen's along the shoreline, nor any staining of soils or rock-faces along the entire northeast section of Bradford Island.

I hope this answers your questions.

Carolyn Markos
808-5406

Year	Photo No.	Description
1936		Dam is under construction. Upstream end of Bradford Island is wooded and untouched by construction. Site of landfill appears to have irregular surface and less vegetation than other forested areas, but does not appear to be in use.
1942	1-M-16-42	Dam is in partial operation and still under construction. A road along the north shore is constructed to the northeast tip. The road leads to an anchor for a log boom upstream of the spillway. The site of the landfill is mostly cleared and leveled. Topography of site is fairly low along north shore with a plateau at east end and west end of clearing. A few piles of material seen near the water on north shore and at extreme southeastern edge of clearing. Footpath through wooded area visible from landfill area to construction work area.. House with boat dock and two slips on southeast edge of island.
1952 9 Aug	52-138	Area of landfill is heavily used. Road is well established and appears to be on the same alignment as present. The area is evenly graded, showing evidence of filling. It appears that truck end dump rubbish along north shore near east end. Piles of rubbish clearly present ringing the east end of the clearing, mostly concentrated at north edge. West end of clearing along the road apparently used for equipment and structural material storage. Visible along the road are steel frame structures, six upright cylindrical tank-like structures (about 2000 gal), stacked raw structural steel or wood. The water tower on the island as been constructed. The boat dock has been removed.
1954 24 Apr	54-818	Evidence of additional filling at east end of site. It appears material is dumped and then graded and covered, pushing material to the north. There is fresh fill at the north edge of the area. A steep slope is appearing at the north edge of the fill. There is an approximately 20 foot wide bench at the original ground level at the shore. Much of the material stored on site in the 1952 photography appears in the same location. The house appears abandoned and damaged.
1958 30 Aug	58-952	A north to south line of fill and debris bisects the site (may be a central burn pile). Dark staining from liquid is at the south edge of the site and toward east side. A garage and shed have been erected at the east end of the site. The northeast edges of the site are now used for storage of materials and equipment. Between 80 and 100 drums are stored together within 30 feet of the east edge of the site. Materials previously observed are still stored at the west side of the site. The road has changed from a south access to an area for backing and off-loading to a loop.
1959 30 Sep	59-2025	Area appears to be converted to storage rather than disposal except for the "burn pile" area. Materials stored around north and east edges of the area. Two vehicles on site. No drums visible.
1967 8 Aug	67-1240	More disposal apparent along northeast to southwest tending area in center of site, appears to have created an upper terrace to the east. The terraced area is larger than in 1959, giving the impression that filling toward the west has occurred through the center of the site. More equipment/material stored at east and northeast edges of site. No drums visible.
1968 17 Oct	68-2207	Rubbish clearly visible in west face of terrace. May be up to 10 feet high. Continued use of areas along north and east edges to store materials. Approximately 50 drums north in north central area.
1970 17 Aug	70-1356	Use of site well established. East edge near garage and shed regularly used. Northeast edge of site for materials storage. Continued dumping expands terrace toward the west. Lower west side used for material storage. Apparent staining on ground in north central area near where drums were in the 1968 photo. No drums visible.
1971 2 Jan	71-778	Rubbish in face of terrace clearly visible. Material stored at northeast corner appears to be lumber. Material still stored on lower west side includes the circular structures seen in 1952 photo. Approximately 40 drums stored together in the same north central area.
1973	73-1780	Additional rubbish in face of terrace appears long and narrow like scrap steel or lumber.

5 Aug		Soil staining around four drums stored on cover material at south edge of terrace face. Possible crib as mentioned in 21 Mar 96 memo on lower terrace. Upper terrace storage area full. Garage demolished. Less than ten drums in different areas on site. Ground appears stained in north central drum storage area.
1978 7 May	78-1472	Face of landfill terrace appears covered. 30 drums stored at east end of site. Material stored at east end, north side and west side. What appears to be a tanker trailer stored in center of site.
1979 4 Apr	79-205	Dumping along face of terrace at both ends appears active. About 30 drums at east end of site. Material storage and movement changes, but storage areas remain the same. The tanker trailer is no longer on site.
1980 9 Mar	80-545	Site appears similar to 1979 photography. Drum storage and face of landfill look the same. Equipment storage similar.
1981 26 May	81-827	No additional dumping apparent. Numerous drums at east end of site. Soil staining at drum storage area.
1982 7 Jun	82-763	Appears to be fresh cover material over the face of the west terraced landfill. Equipment storage unchanged. About 50 drums stored at east end. Where drums removed, staining beneath.

APPENDIX B

CORPS OF ENGINEERS DRILLING LOGS

HOLE NUMBER: D 2001Z		pg 1 of 1		FEATURE: BONNEVILLE NEW NAVIGATION LOCK	
TOP ELEVATION: 95.5		COORDINATES: N 723,081 E 1,632,156			
TOTAL DEPTH: 97.5		INCLINATION FROM HORIZ: Vertical			
O.B. DRILLED:		ROCK DRILLED:		BEARING:	

EL	DEPTH	ENG. UNIT	U.S.C.S.	DESCRIPTION	LAB AND FIELD DATA				PIEZ.	DRILL AND CSQ.	
	0			GP-GM SILTY SANDY GRAVEL w/BOULDERS, brown, v. stiff							Churn Drill 8" Dia Hole
	10			SILTY GRAVELLY SAND, brown, moist, v. dense, APL, 4 inch max, micaceous.							
	10			SILTY GRAVELLY SAND w/ORGANIC MTL, brown, damp, NP, micaceous.							
	20			SILTY SAND w/ROCK FRAGMENTS, brown, damp, APL (NP 12"-13"?)							
	20			CLAYSTONE AND BASALT? ROCK FRAGMENTS.							
	20		SM	SILTY GRAVELLY SAND, brown, damp, APL.							
	25			SILTY SAND w/ROCK FRAGMENTS, CD Tec							
	30			SILTY GRAVELLY SAND w/ROCK FRAGS., brown/gray, moist, APL, micaceous							
	30			SILTY GRAVELLY SAND, brown, damp, BPL, compact to dense, micaceous, 10% cobbles, 20% Gravel, 35% Sand, 35% Fines							
	40			SILTY SAND, brown, damp, NP, micaceous							
	40			SILTY GRAVELLY SAND, brown, NP, micaceous							
	50			GM SILTY SANDY GRAVEL, brown, moist, NP, 20% fines							
	50			SB SANDSTONE, brown, dry, fine, slide block.							
	50			SILTY GRAVELLY SAND, brown, CD Tec slide block, wet, NP to APL, micaceous 55-57"							
	60			GM ROCK FRAGMENTS w/SILTY GRAVELLY SAND, Tec (X.M)							
	60			MH SANDY SILT, brown, damp, BPL, 10% R.F.s							
	60			SM/MH SILTY GRAVELLY SAND & SANDY SILT, gray.							
	70			GM SILTY SANDY GRAVEL, brown, wet, APL, 50% Gravel, 30% Sand, 20% Fines, silt interbed 71-72							
	70			SILTSTONE, gray, PD, Tec, damp.							
	80			SANDSTONE, brown, damp, PD, Tec							
	80			SILTSTONE & CONGLOMERATE interbeds							
	80			CONGLOMERATE, brown, fresh to PD, most silted, damp, NP, Tec							
	90			SB SILTSTONE, SANDSTONE, CONGLOMERATE, thin beds, brown, damp, PD, soft to v. soft, Tec							
	90										
	100										
Date Completed 1 Sept. 76 1"-1" Drill Log: Sept 76 1"-10" Summary Log: Nov 84											

HOLE NUMBER: **DH 2002Z** pg 1 of 1 FEATURE: **BONNEVILLE NEW NAVIGATION LOCK**

TOP ELEVATION: **114.65**

COORDINATES: **N 723.595**

E 1,633,094

TOTAL DEPTH: **115.2**

INCLINATION FROM HORIZ: **Vertical**

O.B. DRILLED:

ROCK DRILLED:

BEARING:

EL	DEPTH	ENG. UNIT	CLASS AND WEATH.	DESCRIPTION	HARD COMP. STD. (PLT)	CORE REC. %	ROD %	PLANES OF WEAKNESS		DWR %	WPT. (ft)	PIEZ.	DRILL AND CSG.
								Angle with Respect to Core	Other				
	0					0	100	0	100				
	10		Fill SM	SILTY SAND, brown, wet (oily), APL, very soft, contains occasional gravel and rusted metal fragments									Tricone
102.5	20		SP	SAND and SILTY SAND, with completely decomposed Tec									2.75" Dia. Bit
		RSD											Tricone
			SM	side blocks, gray, damp, soft									2.75" Dia. Bit (Fine)
87.5	30			SANDSTONE, fresh to stained state, lt grey to medium grey, damp, soft to mod. hard, contains seams of completely decomposed rock surrounding fresh clasts.									
71.5	40												2.5" Dia. Bit (Fine)
	50	SB (Tec)		SILTSTONE, w/interbedded sandstone, fresh to stained, dark grey to brownish grey, damp, mod. hard, DQ, massive.									4" Dia. Bit (Fine)
59.5	60			CONGLOMERATE, fresh clasts in a stained to completely decomposed silty sand matrix, fine to med. to SM, grey brown to grey, some NP, most APL, soft, 60% clasts.									2.5" Dia. Bit (Fine)
42.5	70			VOLCANIC MUDFLOW, grey, 10% angular clasts									
39.5	80			CONGLOMERATE, majority fresh to stained, mod. hard, DQ, grey to green grey, matrix silt to fine sand, clasts compose 35-40% of rock, clasts are hard to mod hard, most clasts are PO igneous rock									2.5" Dia. Bit (Coarse)
	90	SB (Tec)											
	100												
	110												
-1	120												

Date Completed
7 Sept. 76

1" x 1" Drill Log: Sept. 76

1" x 10" Summary Log: Nov 89

TOP ELEVATION: 140.6
 TOTAL DEPTH: 136.3
 O.B. DRILLED: 136.3 (SD & SB) ROCK DRILLED:

COORDINATES: N 723,387 E 1,633,065
 INCLINATION FROM HORIZ: Vertical
 BEARING:

EL	DEPTH	ENG. UNIT	CLASS. AND WEATH.	DESCRIPTION	HARD. COMP. STR. (PLT)	CORE RECV. %	ROD %	PLANES OF WEAKNESS											DWR %	WPT cfm psi (ft)	PIEZ	DRILL AND CSQ.
								Angle with Respect to Core														
140.6	0					100	100												0			
	10	SD	MH	GRAVELLY SANDY SILT, brown, dry to damp, NP grading to AP, 10% gravel, 40% FMS sand, 50% silt																		Aug 8:1?
	12.4		MH	BOULDER, gray, fresh, hard																		
	20			GRAVELLY SANDY SILT (as above)																		
	22			CONGLOMERATE, brown, damp, CD matrix, 60% fine gravel, shell	So																	
	24			SANDSTONE, fresh to stained, brown to gray, CO to DO, soft to med. hard, 15% gravel clasts, coal seams.	mh																	
	30			CONGLOMERATE, PD matrix, brown, matrix MH sandy silt, 60% clasts up to 1 1/2". Hard	So																	2.75" Dia. Bit
	40			GRAVEL CLASTS RECOVERED - MOST matrix ground up and lost in drill water.	CQ																	
	50			SANDSTONE, gray to brown, fresh to stained	DO																	
	60	SB (S)		SANDSTONE, PD, some DO cores, friable, dark gray, NP silty sand w/ 10% angular rock fragments to 6"	mh																	
	70	(Toc)		PD silty sand matrix, gray, CO/DO, soft. >10% angular rock fragments to 4"	DO																	
	80			CONGLOMERATE, PD matrix, friable, soft, CO/DO, gray, MH and PLms occasionally present in decomposed matrix of silty sand, clasts make up ~ 50 to 60% of rock.	So																	
	90			Matrix washes away easily - caving is frequent after core barrel is withdrawn.	CQ																	
	110			SANDSTONE PD, friable, soft, DO, gray to black, 5 to fine gravel clasts	So																	4" Dia. to 110"
	120			SILTSTONE, PD, friable, DO, lt gray	mh																	
	122			CONGLOMERATE, PD matrix, 60% clasts	DO																	
	124			SILTSTONE, PD, friable, soft, DO																		
	126			CONGLOMERATE, PD matrix, friable, soft matrix, 50-60% clasts to 8.5"	So																	
	130			SANDSTONE, PD, friable, soft, DO gray, fine to medium grained, 5-10% gravel clasts.	CQ																	
	136.3			CONGLOMERATE, PD, soft matrix, 60% gravel.	DO																	Cave

Date Completed
27 Sept 76

NOTE: Drilling methods appear to have caused core decomposition and core losses. Clasts lodged in drill bit ground up poorly cemented sedimentary rock. The same rock types stand nearly vertical in nearby rock cuts. Drill rods vibrated often, drill cuttings and sandy matrix from hole wall heaved into hole when water circulation interrupted and core barrel withdrawn.

1" Drill Log: Sept 76
1"-10" Summary Log: Nov 84

APPENDIX C

PHOTO LOG



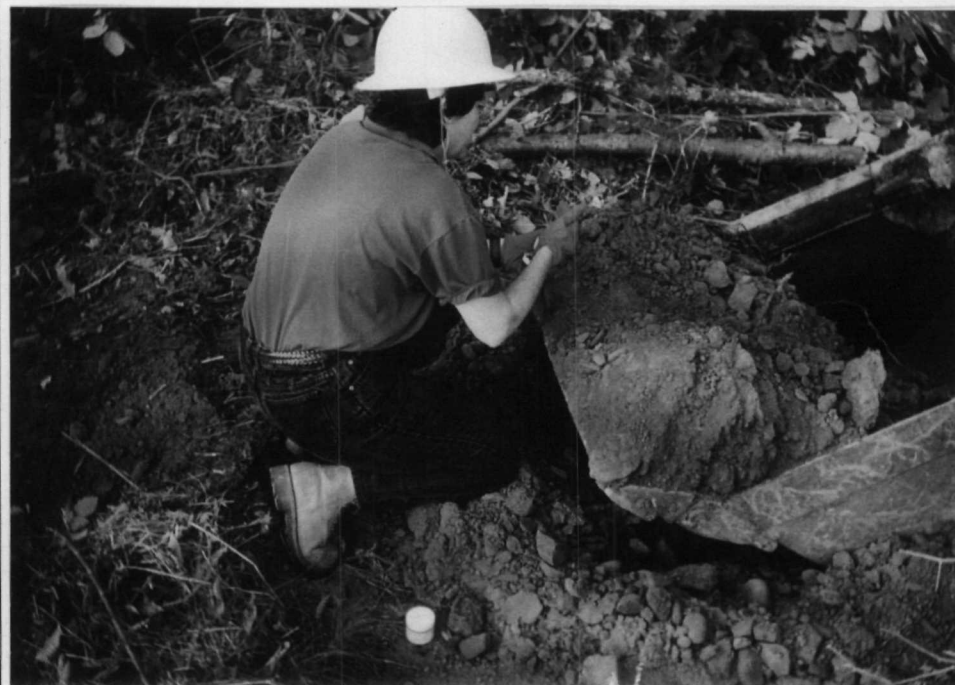
1. Drilling of boring SB02 (MW2), adjacent to the pesticide mixing area, looking southeast.



2. Surface completion of well MW2 looking southeast.



3. Collection of background surface soil sample BK-1, looking south.



4. Collection of soil sample PW1-SS-01, downgradient of the pesticide mixing area looking southwest.



5. Material being removed from 6 feet BLS in test pit TP1, looking northwest.



6. Material collected for sample TP-SS-01, looking northeast.



7. Material removed from test pit TP1, looking northeast.



8. Test pit TP3 after completion (bedrock at 2 feet BLS), looking southeast.



9. Material collected from test pit TP5 for sample TP5-SS-01, looking east-northeast.



10. Material removed from a depth of 3 feet BLS in test pit TP5, looking east.



11. Material removed from test pit TP5 including two mercury vapor lamps, looking south-southwest.



12. Test pit TP8 at the completion depth of 4 feet BLS, looking northwest.



13. Monitoring well MW1 with straw covering backfilled test pit TP2, looking west.



14. Monitoring well MW2 with straw covering backfilled test pit TP8, looking west.



15. Monitoring well MW3 with straw covering backfilled test pit TP4, looking east.



16. Monitoring well MW4 with straw covering backfilled test pit TP5, looking northeast.

APPENDIX D

LAND SURVEY RESULTS

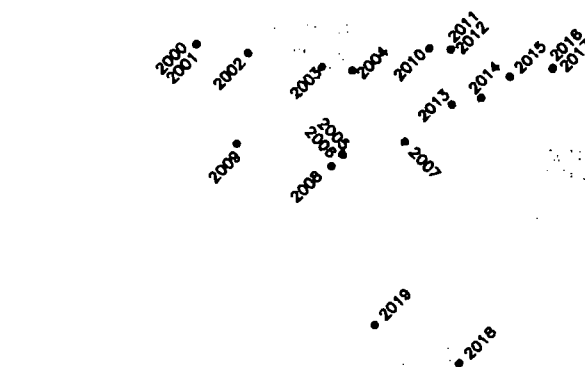
BRASS DISKS ON SOUTH SPILLWAY
• 500+
• 501+
• 502+
• 503+

*BASE COORDINATES AND ELEVATIONS PROVIDED BY SCOTT KOOL - CORPS OF ENGINEERS (503) 808-4849
+ELEVATIONS GIVEN FROM TETRA TECH, INC. - CARLOTTA CELLUCCI (206) 624-2692
HOR. NAD '27 ORE. NORTH (=/- 0.5FT.)
VERT NGVD '29

STATE PLANE COORDINATES

Pt.No.	North	East	Elevation	Desc.
2	723635.61272	1633039.96993	111.66191	H&T
3	723574.24116	1633217.02376	111.47465	H&T
5	723646.69608	1631784.01302	98.11720	PK
6	723682.38824	1631821.77243	97.11290	PK = 1
8	723399.34666	1633136.59809	142.35397	H&T
*25	723776.67130	1630600.16890	63.76700	C-P.K. NAIL FND.
*112	723734.66340	1630910.45670	63.87000	PK NAIL
+500	723919.64232	1631796.02880	99.15000	P-16 BRASS DISK
+501	723859.65045	1631793.69785	99.14544	P-17 BRASS DISK
+502	723799.76995	1631791.34175	99.09893	P-18 BRASS DISK
+503	723734.81237	1631788.78710	99.70297	S.M.3+95 BRASS DISK
2000	723653.79896	1632933.90466	105.49575	MW1 TOP PVC N SIDE
2001	723654.08187	1632934.22551	102.84073	TOP CONC. MW1 L17206
2002	723646.42877	1632974.97014	104.23357	TP-2SS01
2003	723635.41423	1633034.77609	111.36431	TP-7SS01
2004	723632.40677	1633059.31738	112.75729	TP-1SS01
2005	723564.81346	1633051.27278	116.56051	MW2 TOP PVC N SIDE
2006	723564.72884	1633051.65839	114.20999	TOP CONC. MW2L17207
2007	723574.52769	1633101.41070	114.48267	TP-8SS01
2008	723555.29462	1633042.23052	113.60666	PW-1
2009	723573.75078	1632966.06683	110.62786	BK-1
2010	723650.30394	1633121.33990	113.02780	TP-5SS01
2011	723649.42188	1633138.73490	114.78816	MW4 TOP PVC N SIDE
2012	723649.76332	1633138.71465	114.47193	TOP CONC. MW4L17209
2013	723605.04448	1633139.10071	112.98416	TP-6SS02
2014	723609.88200	1633162.73113	112.72224	TP-6SS01
2015	723626.80463	1633185.94206	113.00497	TP-4SS01
2016	723633.76446	1633220.54484	115.21456	MW3 TOP PVC N. SIDE
2017	723634.20677	1633220.52260	112.99039	TOP CONC. MW3 L17208
2018	723395.95102	1633145.10170	142.87120	BK-2
2019	723427.23827	1633076.67334	146.22694	BK-3
2020	723519.22424	1630650.44352	64.19347	H-380 cv9 BRASS DISK ELEV. PROVIDED BY C.O.E. 65.99

MONITOR WELL LOCATIONS-EAST END OF BRADFORD ISLAND

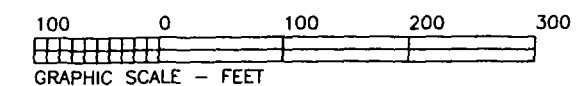


LEGEND

MW MONITORING WELL
H&T HUB AND TACK
PK "PK" NAIL
TP TEST PIT
BK BACKGROUND POINT

NOTES:

ELEVATIONS AND HORIZONTAL LOCATIONS ARE BASED ON 2 CONTROL P.K. NAILS (PT. NO.'S 25 AND 112) LOCATED NORTH OF POWER HOUSE 1, AND EAST OF THE BRIDGE OVER THE FISH LADDER. DATA PROVIDED BY CORPS OF ENGINEERS. ELEVATIONS WERE CONFIRMED ON BRASS CAPS LOCATED ON THE SPILLWAY, AS SHOWN ON THE ABOVE MAP. MONITORING WELLS WERE LOCATED FOR POSITION AND ELEVATION AT THE TOP OF THE CONCRETE CASING AROUND EACH WELL PIPE, AND AT THE TOP OF THE PVC PIPE EXTENDING OUT OF THE CASING. STEEL PIPE CASING POSITIONS WERE NOT DETERMINED.



C.O.E. PORTLAND CONTRACT DACW 57-96-D-0009

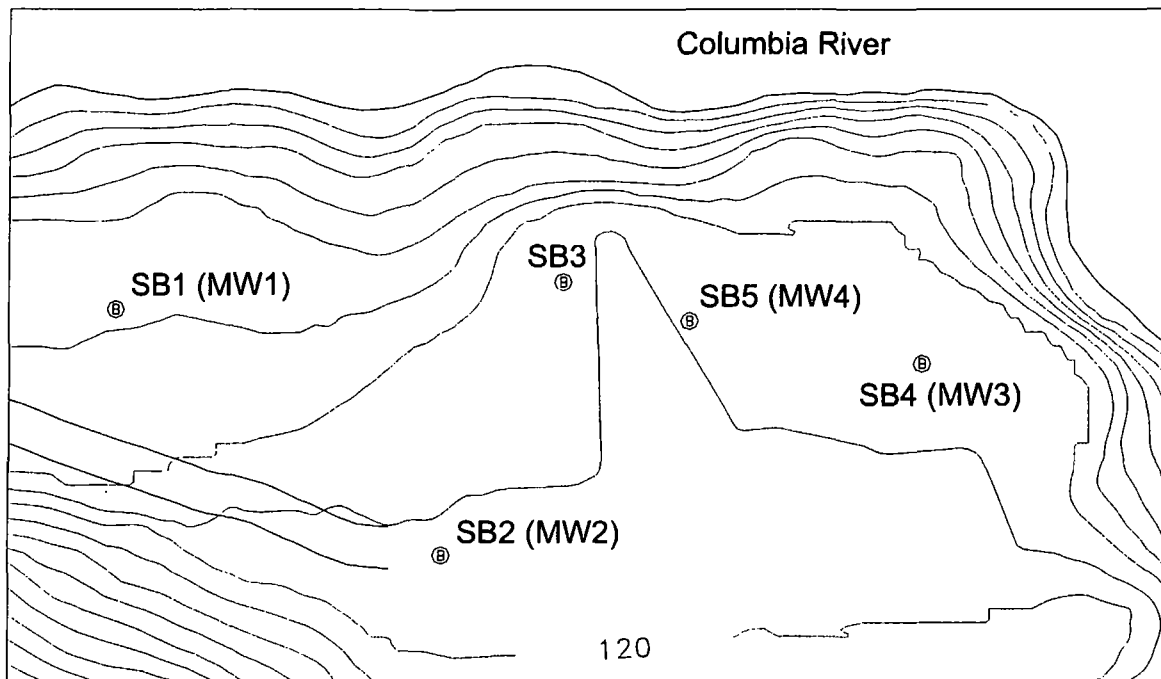
DATE: 08/31/98	SCALE: 1" = 100'	KENT W. COX AND ASSOCIATES, INC. CONSULTING ENGINEERS - LAND SURVEYORS 204 NORTHEAST KELLY AVENUE GRESHAM, OREGON 97030 (503) 667-4464 ENGINEERING PLANNING SURVEYING LAND DEVELOPMENT	MONITORING WELL LOCATION SURVEY FOR TETRA TECH, INC. BONNEVILLE DAM - BRADFORD ISLAND CASCADE LOCKS, OREGON	SHEET 1/1
DRAWN BY: D.T.B.	FILE NO: 98087WK.DWG			

APPENDIX E

FIELD BORING LOGS


HTRW DRILLING LOG		DISTRICT Portland		HOLE NUMBER SB1	
1 COMPANY NAME Tetra Tech, Inc.		2 DRILL SUBCONTRACTOR Cascade Drilling		SHEET SHEETS 1 OF 3	
3 PROJECT USCOE Bradford Island Landfill		4 LOCATION Bradford Island Landfill			
5 NAME OF DRILLER Steve Hughes		6 MANUFACTURERS DESIGNATION OF DRILL CME 75			
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4.25" ID (9.25 OD) HSA 18" long, 2" OD split spoon sampler 140 lbs with 30-inch drop		8 HOLE LOCATION West end of landfill (723653.80 North) (1632933.91 East)			
		9 SURFACE ELEVATION 102.84' (TOC = 105.50')			
		10 DATE STARTED 8/17/98		11 DATE COMPLETED 8/17/98	
12 OVERBURDEN THICKNESS 28'		15 DEPTH GROUNDWATER ENCOUNTERED No Groundwater			
13 DEPTH DRILLED INTO ROCK 2' (fractured)		16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED No groundwater after >24 hours			
14 TOTAL DEPTH OF HOLE 30'		17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18 GEOTECHNICAL SAMPLES 0	DISTURBED 0	UNDISTURBED 0	19 TOTAL NUMBER OF CORE BOXES 0		
20 SAMPLES FOR CHEMICAL ANALYSIS	VOC 1	METALS/SVOCs 1	OTHER (SPECIFY) PCB - 1	OTHER (SPECIFY) Chlor herbs - 1	OTHER (SPECIFY) TPH - 1
21 TOTAL CORE RECOVERY					
22 DISPOSITION OF HOLE Well installed	BACKFILLED	MONITORING WELL X	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR	

LOCATION SKETCH/COMMENTS:

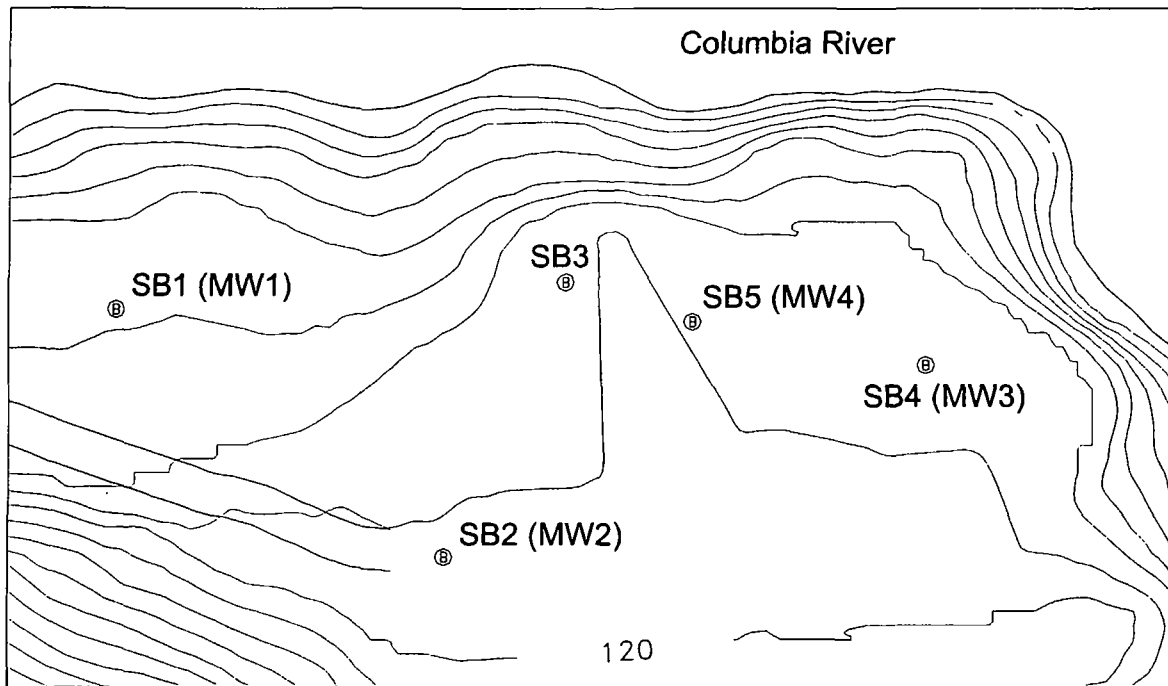


PROJECT Bradford Island	HOLE NO. SB1
ENG FORM 5056-R, AUG 94	
(Proponent: CECW-EG)	

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB1	
PROJECT Bradford Island			INSPECTOR Carlotta Cellucci				SHEET 2	SHEETS OF 3
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)	
	0	Grassy cover underlain by brown sandy silt with gravel (ML) (sand 10%, gravel 30%, fines 60%) loose, dry						Background PID reading = 2.8
	1							
	2							
	3							
	4							
	5	No recovery				40 50		No recovery at 5' drilled to 6' BLS
	6	No recovery (1" slough)	2.7			31 64 72		About 1" of slough in sampler at 6' BLS
	7	Dark brown clayey silt (ML) with gravel, moist, firm (gravel 5%, fines 95%) grading, to silty clay (CL) at approximately 7.5' BLS, low plasticity (95% fines, 5% gravel)	2.7			13 13 17		2' of recovery in 2.5' sampler at 7' BLS
	8							
	9							
	10	Same as above with areas of orange oxidation in spots grading to gray silty clay (CL) with gravel at approximately 11' BLS (95% fines, 5% gravel)	3.1			7 7 7		1.25' of recovery Background PID = 3.1
	11							
	12							
	13							Very hard at 13' BLS
	14							
	15	No recovery				86 120		No recovery
	16							Very hard at 16' BLS
	17	Gray silty clayey sand (SM), dry/moist, well graded, (45% fines, 55% sand) possible ash flow	2.7			28 41 60		1.25' recovery

HTRW DRILLING LOG		DISTRICT Portland		HOLE NUMBER SB2	
1 COMPANY NAME Tetra Tech, Inc.		2 DRILL SUBCONTRACTOR Cascade Drilling		SHEET 1 OF 3 SHEETS	
3 PROJECT USCOE Bradford Island Landfill		4 LOCATION Bradford Island Landfill			
5 NAME OF DRILLER Steve Hughes		6 MANUFACTURERS DESIGNATION OF DRILL CME 75			
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4.25" ID (9.25 OD) HSA 18" long, 2" OD split spoon sampler 140 lbs with 30-inch drop		8 HOLE LOCATION Pesticide wash area (723564.81 North) (1633051.27 East)			
		9 SURFACE ELEVATION 114.21' (TOC = 116.56')			
		10 DATE STARTED 8/17/98		11 DATE COMPLETED 8/17/98	
12 OVERBURDEN THICKNESS 30'		15 DEPTH GROUNDWATER ENCOUNTERED No Groundwater Encountered/Dry Hole			
13 DEPTH DRILLED INTO ROCK ~2' (weathered)		16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 32.32 below TOC after 24 hours			
14 TOTAL DEPTH OF HOLE 32'		17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18 GEOTECHNICAL SAMPLES 0	DISTURBED -	UNDISTURBED -	19 TOTAL NUMBER OF CORE BOXES 0		
20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS/SVOCs	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)
					21 TOTAL CORE RECOVERY
22 DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL X	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR 	

LOCATION SKETCH/COMMENTS:



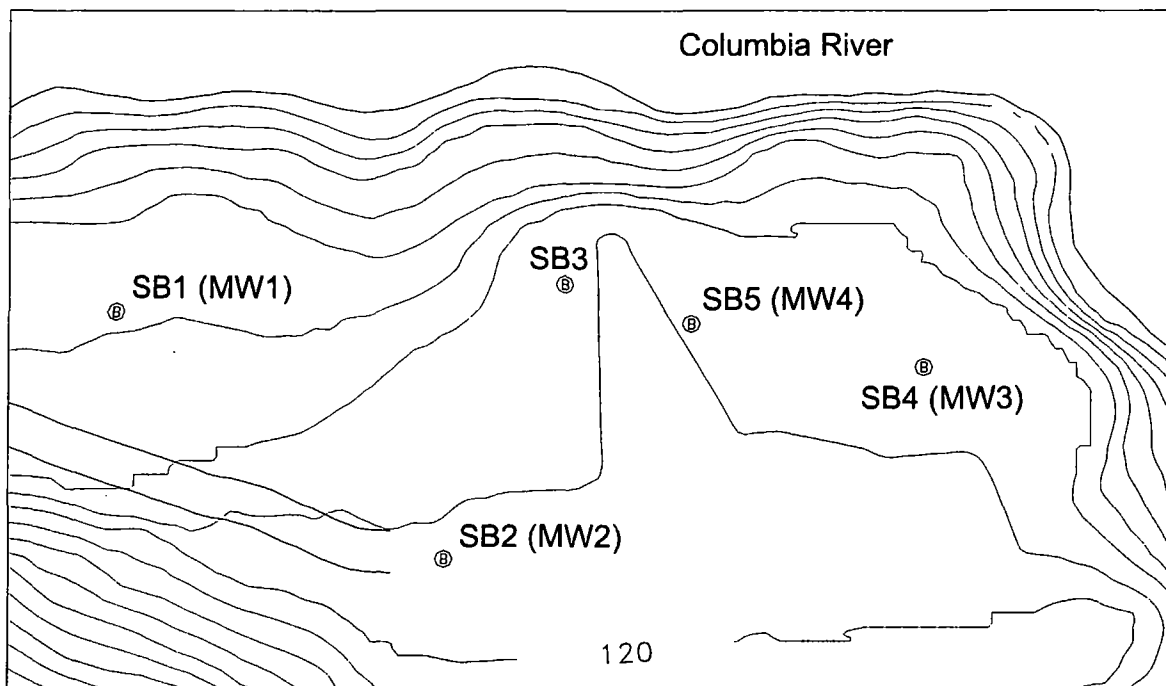
PROJECT Bradford Island	HOLE NO. SB2
ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)	

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB2
PROJECT Bradford Island			INSPECTOR				SHEET 2 OF 3 SHEETS
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	Grassy cover	2.0				Background PID reading = 2.0
	1						
	2						
	3						
	4						
	5	Very dark gray clayey sand (SM) with gravel, well graded, moist (20% fines, 15% gravel, 65% sand), loose-firm.	0.2			28 48 56	Background PID dropped to 0.0 2' of recovery
	6						
	7	Contact at 6.5' BLS with brown sandy silty clay with gravel, (CL) (25% sand, 65% fines, 5% gravel) firm, moist, low plasticity					
	8						
	9						
	10	Brown sandy clay matrix with basalt fragments to cobble size, some moisture in fractures and between matrix and basalt cobbles. Cobbles are angular to subrounded (10-20% matrix, 80-90% fractured basalt)	0.0			18 26 50	1.5' recovery
	11						
	12						
	13						
	14						
	15	Same as above, gray-black fractured basalt in a brown sandy clay matrix. Sand and basalt fragments are angular to subrounded (10-20% matrix, 80- 90% fractured basalt)	0.0			23 50	8" recovery
	16						
	17						
PROJECT Bradford Island						HOLD NO. SB2	

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB2
PROJECT Bradford Island			INSPECTOR				SHEET 3 OF 3
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	18						
	19						
	20	Brown sandy clay with gravel (CL) (10% gravel, 20% sand, 70% fines) low plasticity, moist, firm to contact at approximately 20.5' with desiccated rock (sand with angular gravel) (5% gravel, 95% sand)	0.0			28	1.25' recovery
	21	moist, well graded, angular, dense (granite or macrocrystalline volcanic)	0.0			50	
	22						
	23						
	24						
	25	Gray weathered/desiccated sand stone (ash tuff?), very dense, well graded, moist	0.0			26	1' + 3" slough
	26					50	
	27						
	28						
	29						
	30	Red rhyolitic cobble underlain by gray sand/sandstone/ash tuff (weathered) well graded sandstone fragments are angular, very dense, moist	0.0			40	1' + 3" slough recovery
	31					50	
	32	Gray weathered sandstone/ash tuff, fragmented Total Depth = 32'	0.0			50	6" recovery
	33						
	34						
	35						

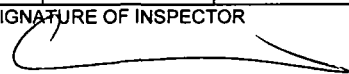
HTRW DRILLING LOG		DISTRICT Portland		HOLE NUMBER SB3	
1 COMPANY NAME Tetra Tech, Inc.		2 DRILL SUBCONTRACTOR Cascade Drilling		SHEET SHEETS 1 OF 2	
3 PROJECT USCOE Bradford Island Landfill		4 LOCATION Bradford Island Landfill			
5 NAME OF DRILLER Steve Hughes		6 MANUFACTURERS DESIGNATION OF DRILL CME 75			
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4.25" ID (9.25 OD) HAS 18" long, 2" OD split spoon sampler 140 lbs with 30-inch drop		8 HOLE LOCATION Central landfill			
		9 SURFACE ELEVATION Not surveyed			
		10 DATE STARTED 8/17/98		11 DATE COMPLETED 8/17/98	
12 OVERBURDEN THICKNESS N/A		15 DEPTH GROUNDWATER ENCOUNTERED N/A			
13 DEPTH DRILLED INTO ROCK N/A		16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED N/A			
14 TOTAL DEPTH OF HOLE 7'		17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY) N/A			
18 GEOTECHNICAL SAMPLES 0	DISTURBED --	UNDISTURBED --	19 TOTAL NUMBER OF CORE BOXES 0		
20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS/SVOCs	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)
22 DISPOSITION OF HOLE	BACKFILLED X	MONITORING WELL	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR	
21 TOTAL CORE RECOVERY					

LOCATION SKETCH/COMMENTS:

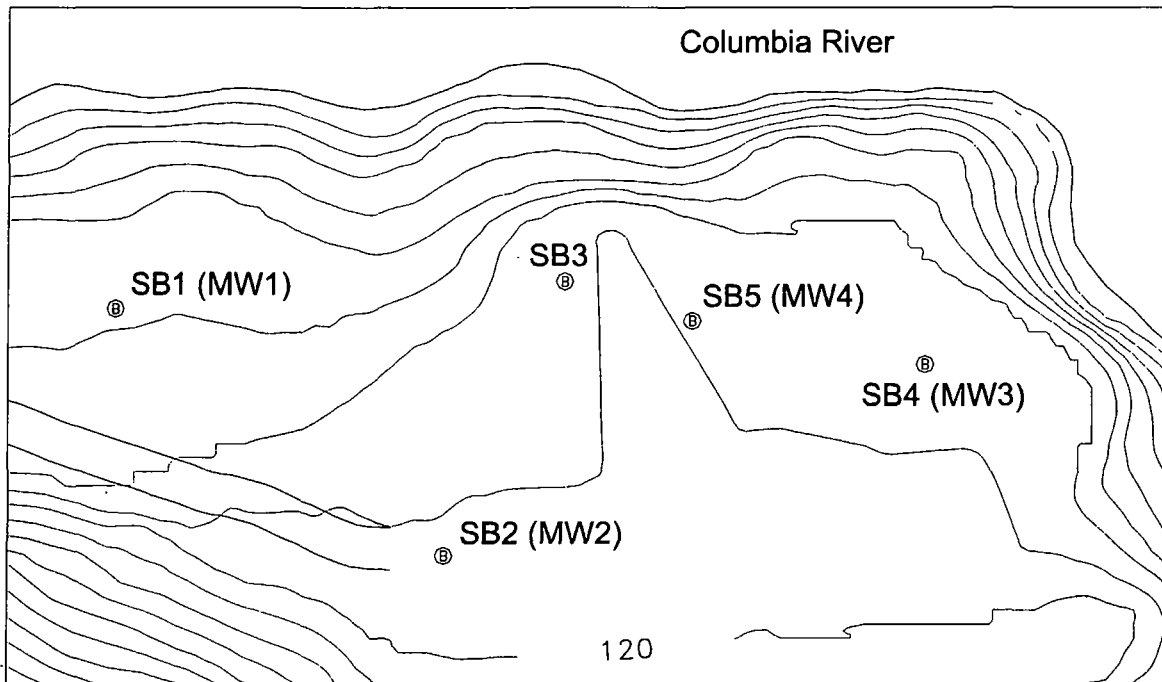


PROJECT Bradford Island	HOLE NO. SB3
ENG FORM 5056-R, AUG 94	
(Proponent: CECW-EG)	

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB3	
PROJECT Bradford Island			INSPECTOR Carlotta Cellucci				SHEET 2	SHEETS OF 2
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)	
	0	Grassy cover						
	1							
	2							
	3							
	4							
Basalt	5	Fractured basalt to contact at approximately 5.5' with well graded fine to very fine grained, moist gray sand (SW) (100% sand) dense				12		
SW	6					6		
	7	Refusal at 7' BLS				4		
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							

HTRW DRILLING LOG		DISTRICT Portland		HOLE NUMBER SB4	
1 COMPANY NAME Tetra Tech, Inc.		2 DRILL SUBCONTRACTOR Cascade Drilling		SHEET SHEETS 1 OF 3	
3 PROJECT USCOE Bradford Island Landfill		4 LOCATION Bradford Island Landfill			
5 NAME OF DRILLER Steve Hughes		6 MANUFACTURERS DESIGNATION OF DRILL CME 75			
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4.25" ID (9.25 OD) HSA 18" long, 2" OD split spoon sampler 140 lbs with 30-inch drop		8 HOLE LOCATION East end of Landfill (723633.77 north) (1633220.55 east)			
		9 SURFACE ELEVATION 112.99' (TOC = 115.22')			
		10 DATE STARTED 8/17/98		11 DATE COMPLETED 8/17/98	
12 OVERBURDEN THICKNESS N/A		15 DEPTH GROUNDWATER ENCOUNTERED Approximately 18'			
13 DEPTH DRILLED INTO ROCK Approximately 0.5' (Fractured)		16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 17.65 after 20 hours			
14 TOTAL DEPTH OF HOLE 21'		17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY) N/A			
18 GEOTECHNICAL SAMPLES 0	DISTURBED --	UNDISTURBED --	19 TOTAL NUMBER OF CORE BOXES 0		
20 SAMPLES FOR CHEMICAL ANALYSIS	VOC 1	METALS/SVOCs	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY) 21 TOTAL CORE RECOVERY
22 DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL X	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR 	

LOCATION SKETCH/COMMENTS:



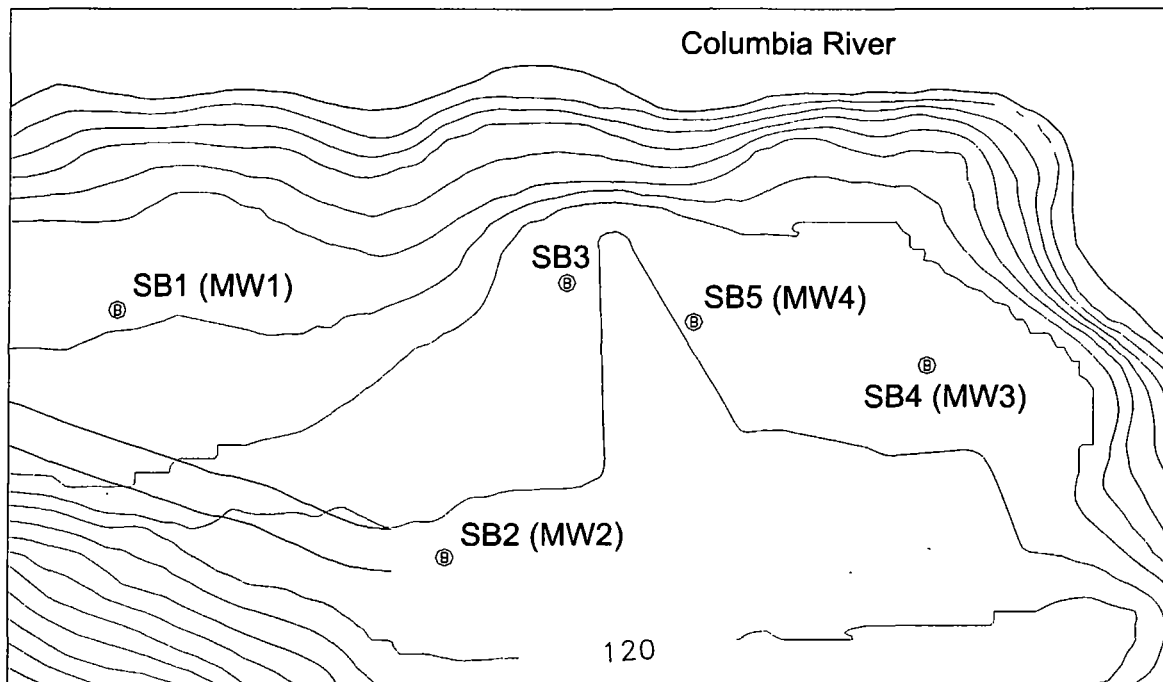
PROJECT Bradford Island	HOLE NO. SB4
----------------------------	-----------------

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB4
PROJECT Bradford Island			INSPECTOR Carlotta Cellucci				SHEET 2 OF 3 SHEETS
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	Grassy cover					
	1						
	2						
	3						
	4						
	5	Brown silty sand with gravel (SM) (fines 20%, gravel 5%, sand 75%) very dense, dry, well graded	0.0			50	1' of recovery
	6						
	7						
	8						
	9						
	10	Same as above with clay (SM) (fines 40%, gravel 5%, sand 55%) very dense, dry to moist, well graded, appears to be weathered basalt (i.e., clayey matrix with basalt/volcanic sand and gravel)	0.0			50	6" of recovery Material packing augers had to pull augers and clean out material.
	11						
	12						
	13						
	14						
	15	No recovery				86 120	No recovery. Material packed auger and bit again at 15' BLS had to pull augers and clean out again. Drilled with center rod and plug
	16						
	17						
PROJECT Bradford Island						HOLD NO. SB4	

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB4
PROJECT Bradford Island			INSPECTOR Carlotta Cellucci				SHEET 3 OF 3
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	18						Became wet at approximately 18' BLS
	19						
Weathered rock	20	Brown weathered rock in silty sand matrix (fines 5%, sand 25%, gravel/angular rock 70%) wet, very dense, well graded	0.0		8/17/98-BIL-SB4-SS-01 (1805)	8	1' of recovery in 1st sampler
	21	second sampler driven at 20' BLS = Fractured basalt in a sand matrix with large volume of free water			VOCs only (Not submitted to the laboratory for analysis)	50	3" of recovery in 2nd sampler
	22						
	23	Refusal at 21' BLS (Hard rock)					
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
PROJECT Bradford Island						HOLD NO. SB4	

HTRW DRILLING LOG		DISTRICT Portland		HOLE NUMBER SB5	
1 COMPANY NAME Tetra Tech, Inc.		2 DRILL SUBCONTRACTOR Cascade Drilling		SHEET SHEETS 1 OF 3	
3 PROJECT USCOE Bradford Island Landfill		4 LOCATION Bradford Island Landfill			
5 NAME OF DRILLER Steve Hughes		6 MANUFACTURERS DESIGNATION OF DRILL CME 75			
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4.25" ID (9.25 OD) HSA 18" long, 2" OD split spoon sampler 140 lbs with 30-inch drop		8 HOLE LOCATION Northeast area of landfill (723649.42 north) (1633138.74 east)			
		9 SURFACE ELEVATION 114.47' (TOC = 114.79')			
		10 DATE STARTED 8/18/98		11 DATE COMPLETED 8/18/98	
12 OVERBURDEN THICKNESS approximately 30'		15 DEPTH GROUNDWATER ENCOUNTERED Between 15-20' BGS			
13 DEPTH DRILLED INTO ROCK Decompose <1'		16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 17.25 after 4 hours			
14 TOTAL DEPTH OF HOLE 30'		17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY) N/A			
18 GEOTECHNICAL SAMPLES 0	DISTURBED --	UNDISTURBED --	19 TOTAL NUMBER OF CORE BOXES 0		
20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS/SVOCs	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)
21 TOTAL CORE RECOVERY					
22 DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL X	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR	

LOCATION SKETCH/COMMENTS:



PROJECT Bradford Island	HOLE NO. SB5
----------------------------	-----------------

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB5
PROJECT Bradford Island			INSPECTOR Carlotta Cellucci				SHEET 2 OF 3 SHEETS
ELEV (a)	DEPTH (FEET) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	Grassy cover					
	1						
	2						
	3						
	4						
	5	Brown silty sand with gravel (SM) (fines 25%, gravel 5%, sand 70%) dry to moist, dense, well graded	1.1			11 11 20	6" recovery (2" of which are slough) Background PID <1.1
	6						
	7						
	8						
	9						
	10	Mottled black/orange/brown silty sand (SM) with gravel (fines 10%, sand 75%, gravel 15%) moist, dense, well graded	0.4			5 5 5	6" of recovery Background PID = 0.3
	11						
	12						
	13						
	14						
	15	No recovery Sampler wet				3 6 4	No recovery
	16						
	17						

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER SB5
PROJECT Bradford Island			INSPECTOR Cariotta Cellucci				SHEET 3 OF 3
ELEV (a)	DEPTH (feet) (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	18						
	19						
	20	No recovery				50	No recovery Background PID = 0.1
	21	Gray gravelly (fractured volcanics) clay (CL) (fines 60%, fractured rock 40%) very stiff, moist-wet, low plasticity	0.1			10 33 50	2.75' recovery
	22						
	23						
	24						
	25	Gray gravelly, clayey sand (SM) (gravel 10%, fines 10%, sand 80%) gravel = angular volcanics, sand is volcanic/angular wet, dense, well graded	1.0			50	5' recovery Background PID = 0.8
	26						
	27						
	28						
	29						
	30	Gray decomposed volcanics in a gravelly clay matrix, moist, very dense, well graded, all gravel and rock is angular	0.3			31 50	2' recovery Background PID = 0.3
	31						
	32	Total Depth = 30'					
	33						
	34	NOTE: A large piece of metal was wrapped around the augers when they were removed from the boring.					
	35						

APPENDIX F

TEST PIT AND FIELD SAMPLING LOGS



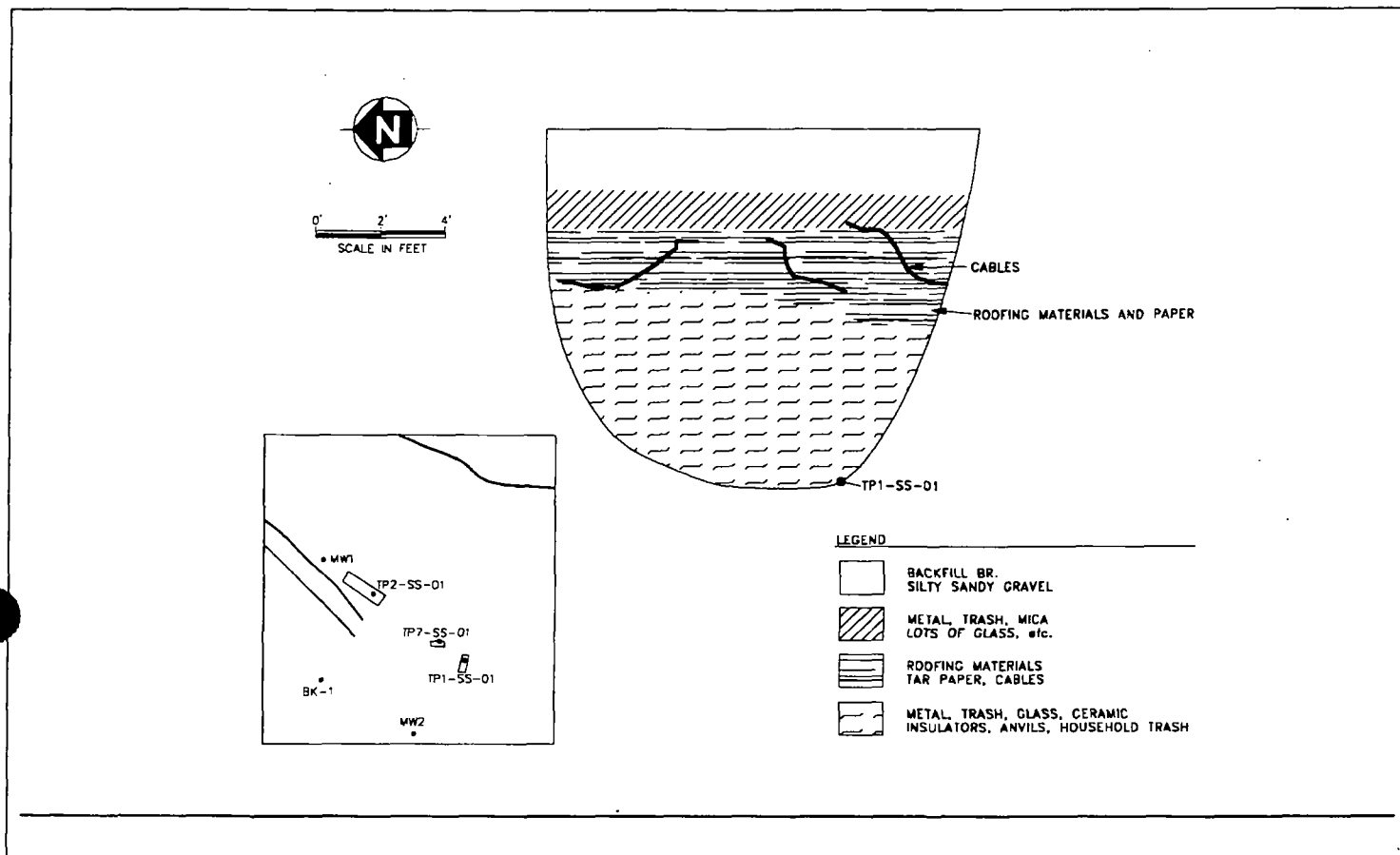
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP1

Test Pit Location: North Central Landfill

Page 1 of 3

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 13 X 5 X 11 deep

Associated Photographs: 1-17 through 1-25

Grab Sample No. 8-19-98-BIL-TP1-SS-01

Time/Date Collected: 0950 / 8/19/98 Depth Collected: 10' BLS Location: TP1 S/SW

PID Reading: 0.0 USCS Designation: GM Soil Color: Very Dark Brown/Black

Soil Description: Silty sandy gravel with trash (fines 10%, gravel/sand 90% - matrix of trash only) wet,
loose-dense, well graded.

Grab Sample No. _____

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: Also collected asbestos samples from material removed from TP1:

8-20-98-BIL-ASB-01 - roofing paper - black at 1415 and 8-20-98-BIL-ASB-02 - silver roofing coating/mastic at 1418



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP1 Test Pit Location: North Central Landfill Page 2 of 3
Temperature: 60's Wind Speed: <5 mph Wind Direction: Variable
General Weather Conditions: Partly cloudy Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-11' BLS Soil Color: Brown USCS Designation: GW
PID Reading: 3.2 (background) Description: Brown silty, sandy, gravel (fines 10%, sand 20%, gravel 70%)
dry-wet, well graded, loose-dense with trash from 2' BLS as described on page 3 attached.

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



Feet BLS	Description	PID
2.5	Top of buried trash, mostly household with mica sheets and small books, and lots of glass fragments	(Background @ 3.2)
4	Buried cables and assorted metal	
6	Buried roofing paper and assorted metal	(Background @ 2.5)
8	Abundance of roofing paper	(Background @ 1.0)
10 to 11	Assorted metal, roofing paper, and cloth, SE corner of bucket wet Sample TP1-SS-01 bucket contained broken glass, broken pieces of ceramic insulators, rusted pieces of metal, and household trash (bottle of nail polish), metal nails	Background dropped to 0.0 0.3 0.0



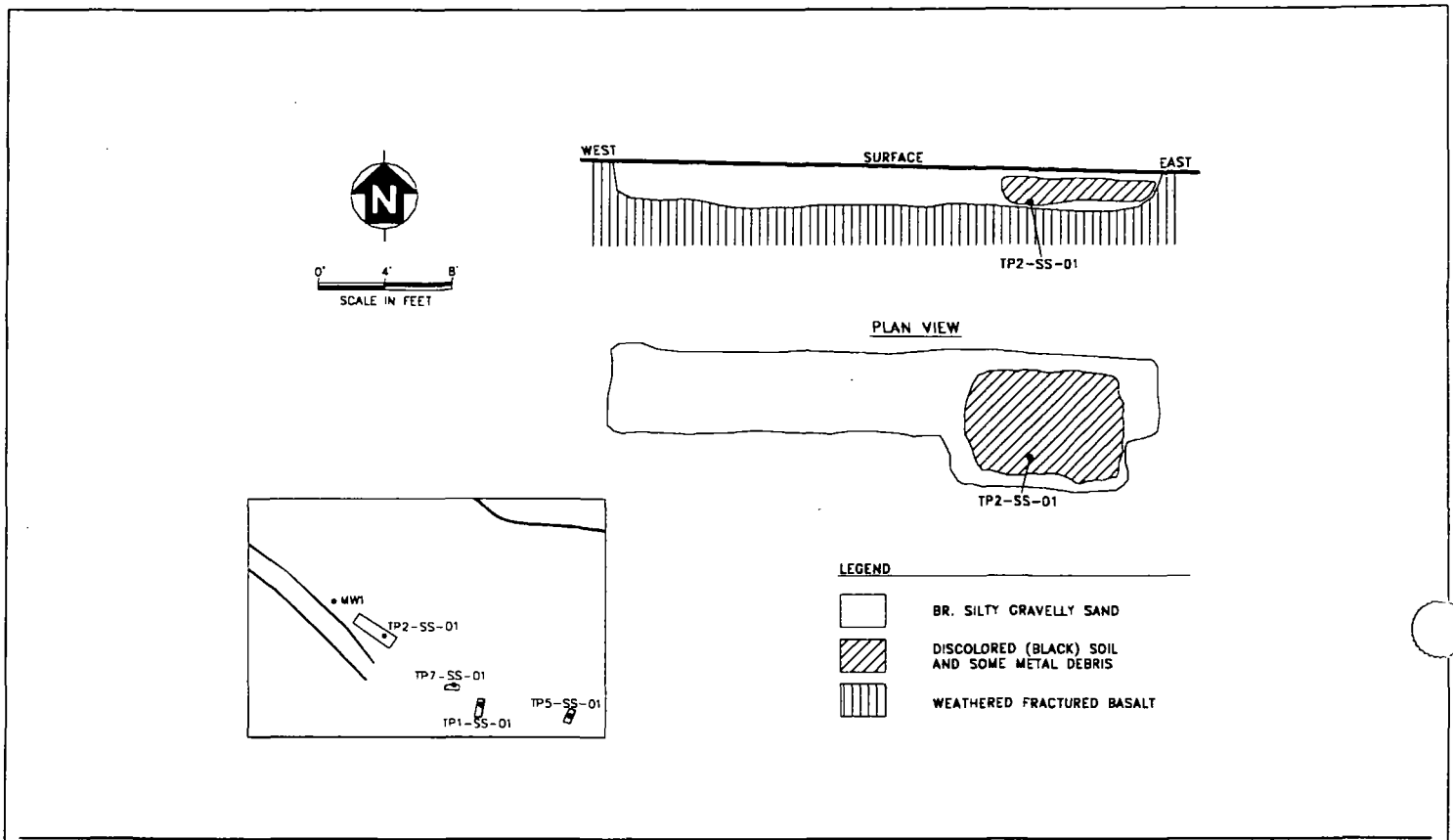
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP2

Test Pit Location: West Edge of Landfill

Page 1 of 3

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 31' X 8' X 2-2.5' deep

Associated Photographs: Camera damaged, photos lost

Grab Sample No. 8-19-98-BIL-TP2-SS-01

Time/Date Collected: 1225 / 8/19/98 Depth Collected: 2' BLS Location: TP2 East End (25' E of West end)

PID Reading: 0.0 USCS Designation: SM Soil Color: Dark Brown

Soil Description: Dark brown silty, gravelly sand (fines 25%, gravel 30%, sand 45%) dry to moist,
dense, well graded with glass fragments and small pieces of metal/nails.

Grab Sample No. _____

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: _____



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP2 Test Pit Location: West Edge of Landfill Page 2 of 3
Temperature: High 60's Wind Speed: <5 mph Wind Direction: Variable
General Weather Conditions: Partly cloudy to clear Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-2.5' BLS Soil Color: Brown USCS Designation: SM
PID Reading: 0.0 Description: Brown silty, gravelly sand (fines 25%, gravel 30%, sand 45%)
dry, dense, well graded.

Depth Range: >2.5' Soil Color: Dark Gray/Black USCS Designation: _____
PID Reading: 0.0 Description: Weathered, fractured basalt, microcrystalline, very hard

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



Feet BLS	Feet East of Western Edge	Contents	PID
2	Entire Length	Fractured basalt contact. Black, microcrystalline, very hard	0.0
1.5-2.5' contact with basalt	22' (37' from MW1) (West end of TP2 is 15' East of MW1)	Black discolored soil with some metal and cables to basalt contact at 2.5 feet BLS. (Western edge of landfill)	0.0



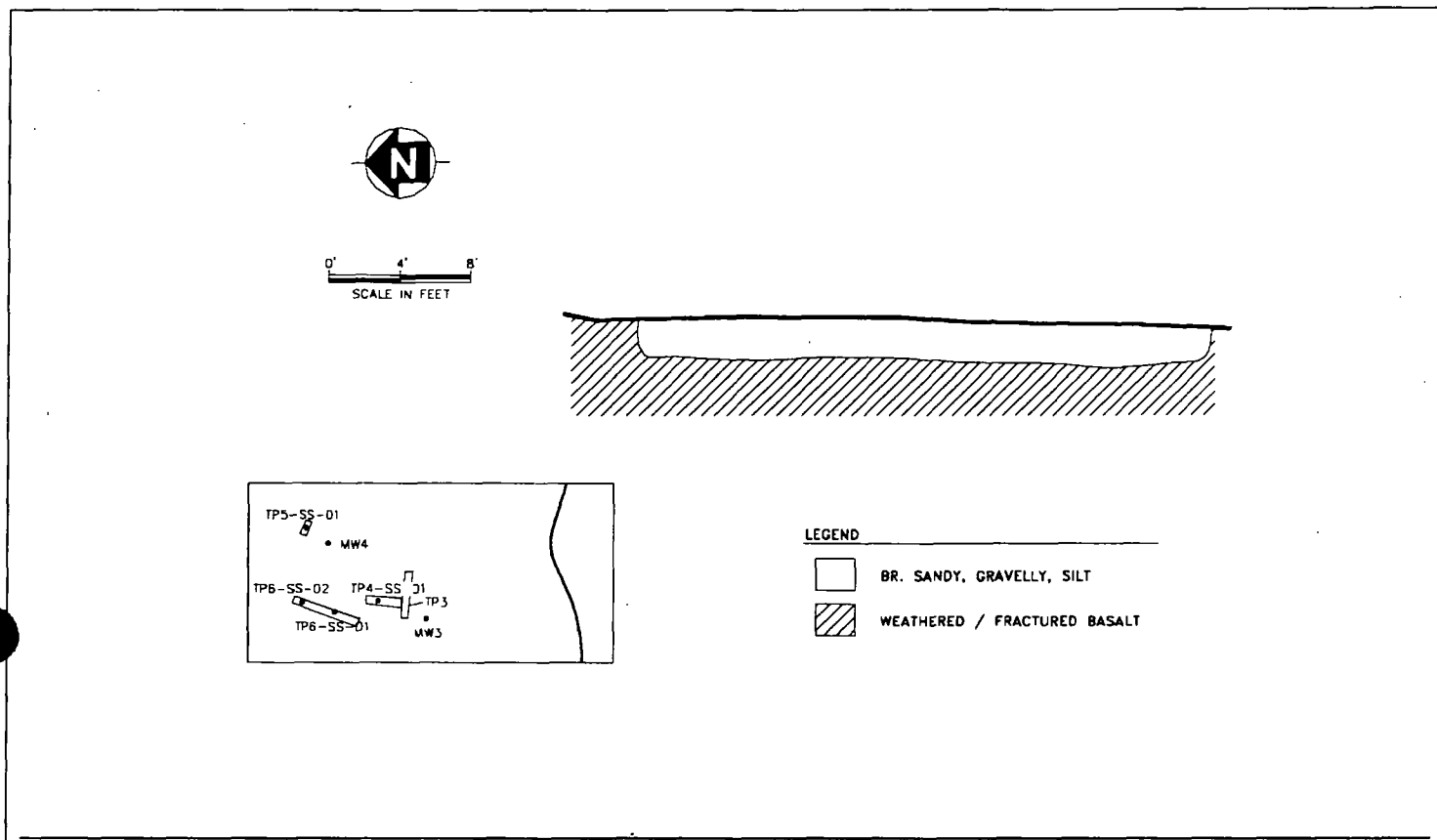
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP3

Test Pit Location: East end of Landfill

Page 1 of 2

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 31' X 4' X 2' deep

Associated Photographs: 2-1

Grab Sample No.

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Grab Sample No.

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: _____



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP3 Test Pit Location: East end of Landfill Page 2 of 2
Temperature: 70's Wind Speed: 5 mph Wind Direction: SE
General Weather Conditions: Clear, light wind Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-2' BLS Soil Color: Brown USCS Designation: ML
PID Reading: 0.0 Description: Brown sandy gravelly silt (sand 15%, gravel 25%, fines 60%)
dry, dense/firm, low plasticity.

Depth Range: >2' Soil Color: Brown/Black USCS Designation: _____
PID Reading: 0.0 Description: Weathered and fractured basalt

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



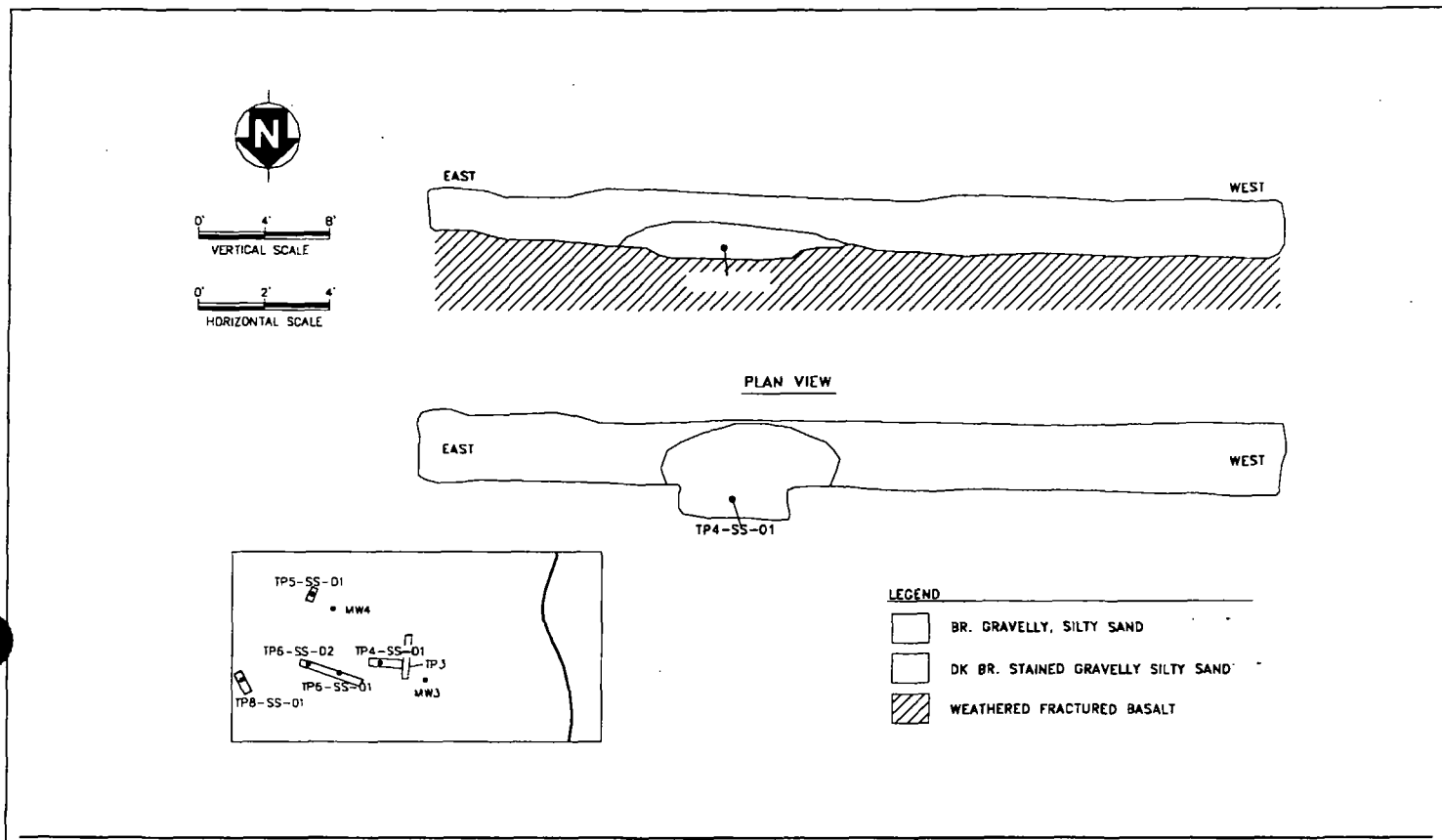
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP4

Test Pit Location: East end of Landfill

Page 1 of 2

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 24.5' X 4' X 3.7'

Associated Photographs: N/A

Grab Sample No. 8-19-98-BIL-TP4-SS-01

Time/Date Collected: 1525 / 8/19/98 Depth Collected: 3.7' Location: TP4

PID Reading: 0.0 USCS Designation: SM Soil Color: Dark Brown

Soil Description: Dark brown gravelly, silty sand (gravel 30%, fines 15%, sand 55%)
dry-moist, well graded, dense.

Grab Sample No. _____

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: _____



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP4 Test Pit Location: East end of Landfill Page 2 of 2
Temperature: 70's Wind Speed: <5 mph Wind Direction: Variable
General Weather Conditions: Clear, sunny Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-3' BLS Soil Color: Brown USCS Designation: SM
PID Reading: 0.0 Description: Brown gravelly, silty sand (gravel 30%, fines 15%, sand 55%)
dry, well graded, dense.

Depth Range: >3' Soil Color: Dark Gray/Black USCS Designation: _____
PID Reading: 0.0 Description: Weathered, fractured basalt

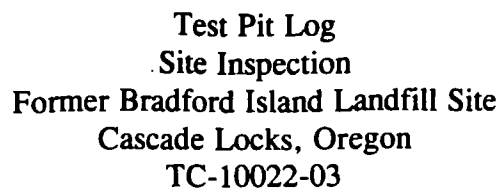
Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



Page 1 of 3

0' 2' 4'

SCALE IN FEET

SOUTHWEST NORTHEAST

TP5-SS-01
TP9-SS-01

LEGEND

ML

TRASH CONSISTING OF TIRES, WOOD, BROKEN GLASS, AND MERCURY VAPOR LAMPS IN ML MATRIX

PLAN VIEW

TP7-SS-01
TP1-SS-01
TP5-SS-01
MW4
MW2
PW-1
TP8-SS-01
TP6-SS-02
TP4-SS-01
TP3
MW3

Comments: Collected TP5-SS-01 in duplicate; TP9-SS-01 as Blind duplicate from this test pit (0955)



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP5 Test Pit Location: North Central Landfill Page 2 of 3
Temperature: 70's Wind Speed: None / <5 mph Wind Direction: Variable
General Weather Conditions: Clear to partly cloudy Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-2.5' BLS Soil Color: Brown USCS Designation: ML
PID Reading: 0.0 Description: Brown sandy, gravelly silt (sand 10%, gravel/cobble 25%, fines 65%)
dry, firm, low plasticity.

Depth Range: 2.5'-5' (TD) Soil Color: Black USCS Designation: _____
PID Reading: 0.0 Description: Debris in above matrix (50% debris), matrix is black and oily. Types
of debris are listed in the table on page 3 of 3 below.

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



Feet BLS	Contents	PID
2.5	Beginning of trash – tire (discolored-black soil matrix)	0.0
3.0	Wood cover underlain by lots of broken glass then more tires	0.0
5	Broken glass, mercury vapor lamps	0.0



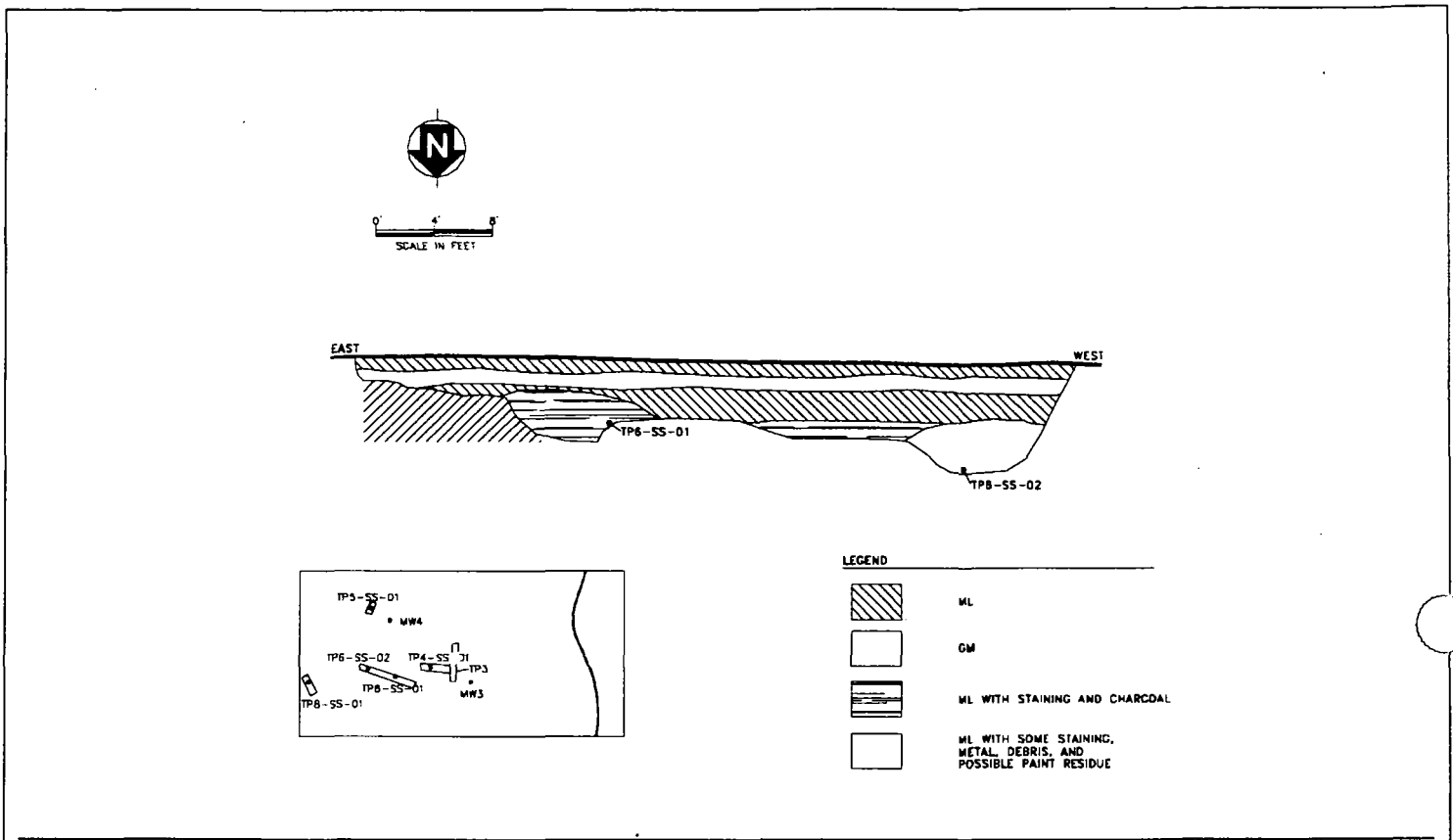
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP6

Test Pit Location: East end of Landfill

Page 1 of 2

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 47' X 4' X 1.5'-6.5' deep

Associated Photographs: 2-10 through 2-12 and 3-1 through 3-3

Grab Sample No. 8-20-98-BIL-TP6-SS-01

Time/Date Collected: 1050 / 8/20/98 Depth Collected: 4' Location: 17' west of east end TP6

PID Reading: 0.0 USCS Designation: ML Soil Color: Black/Very Dark Brown

Soil Description: Black/Very dark brown stained sandy, gravelly, silt (sand 10%, gravel 35%, fines 55%)
moist, firm, well graded, low plasticity.

Grab Sample No. 8-20-98-BIL-TP6-SS-02

Time/Date Collected: 1140 / 8/20/98 Depth Collected: 6.5' Location: 40' west of east end of TP6

PID Reading: 0.0 USCS Designation: ML Soil Color: Brown/Dark Brown

Soil Description: Brown-Dark Brown, sandy, gravelly, silt (sand 20%, gravel/cobbles 15%, fines 65%)
moist, firm, low plasticity with metal and possibly paint waste.

Comments: East end of TP6 is 46 feet west of monitoring well MW3



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP6 Test Pit Location: East end of Landfill Page 2 of 2
Temperature: 70's Wind Speed: 5 mph Wind Direction: South
General Weather Conditions: Partly cloudy, sunny Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-1' BLS Soil Color: Brown USCS Designation: ML
PID Reading: 0.0 Description: Brown sandy, gravelly, silt (sand 31%, gravel 25%, fines 65%),
dry, firm, low plasticity.

Depth Range: 1-2' Soil Color: Brown USCS Designation: GM
PID Reading: 0.0 Description: Brown silty sandy gravel (fines 10%, sand 10%, gravel 80%)
moist, firm, low plasticity.

Depth Range: 2-6.5' Soil Color: Dark Brown-Brown USCS Designation: ML
PID Reading: 0.0 Description: Dark Brown-Brown sandy gravelly silt (sand 20%,
gravel/cobbles 15%, fines 65%) moist, firm, low plasticity with mica flakes, staining, with metal debris
and possible paint residue 40' west of east end of TP6.

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



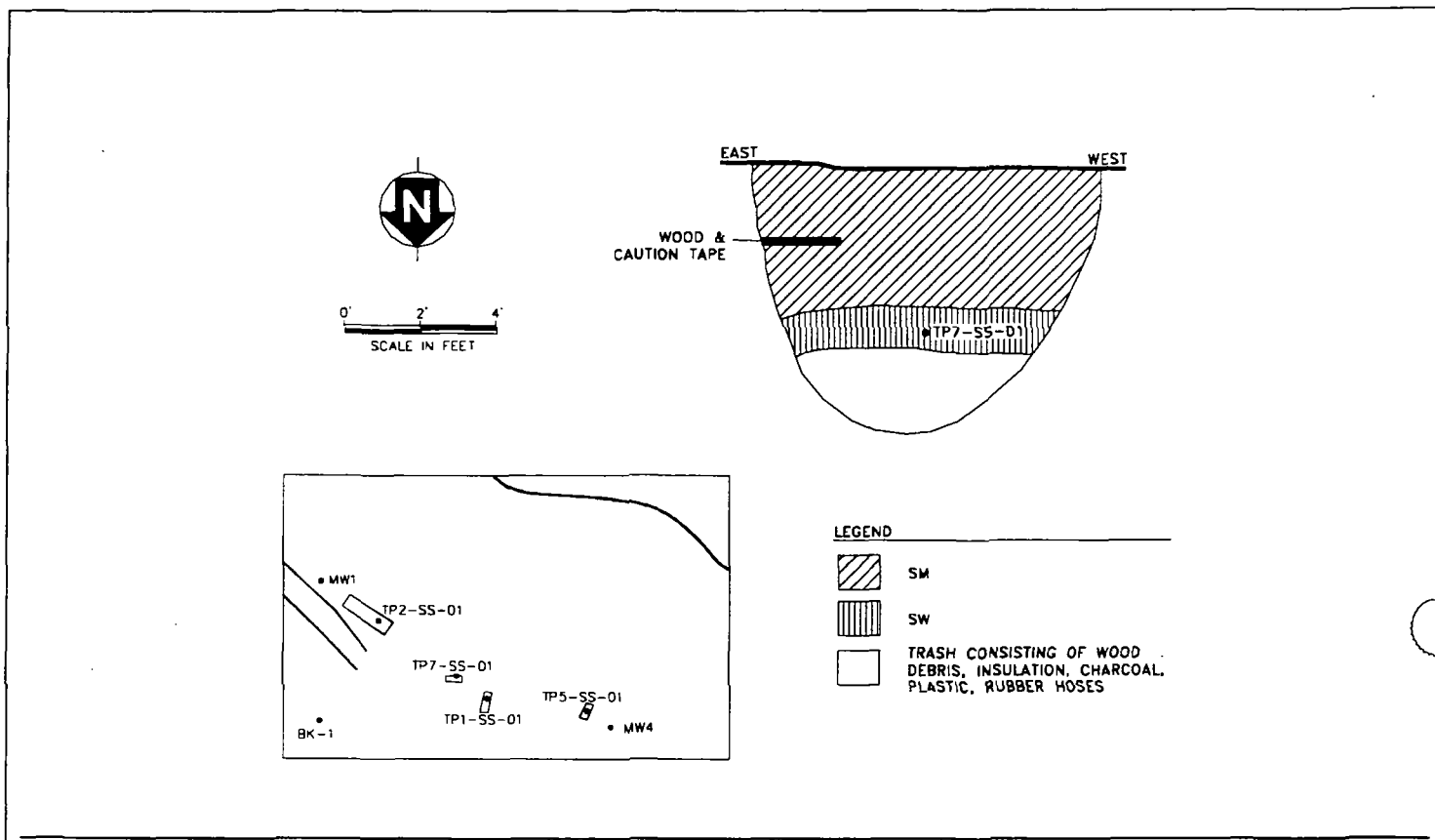
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP7

Test Pit Location: Central Landfill

Page 1 of 2

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 9' X 4' X 7' deep

Associated Photographs: 3-4 through 3-6

Grab Sample No. 8-20-98-BIL-TP7-SS-01

Time/Date Collected: 1350 / 8/20/98 Depth Collected: 4.5 Location: Central Landfill

PID Reading: 0.0 USCS Designation: SW Soil Color: Gray

Soil Description: Gray, fine grained, well graded sand (100%), moist, dense.

Grab Sample No. _____

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: _____



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP7 Test Pit Location: Central Landfill Page 2 of 2
Temperature: 70's Wind Speed: <5 mph Wind Direction: SE
General Weather Conditions: Partly cloudy Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-4' BLS Soil Color: Brown USCS Designation: SM
PID Reading: 0.0 Description: Brown silty, gravelly, sand (fines 15%, gravel 25%, sand 60%)
dry, well graded, dense.

Depth Range: 4'- 7' (total depth) Soil Color: Gray USCS Designation: SW
PID Reading: 0.0 Description: Gray sand, well graded, moist, dense, mixed with debris from 5-7' BLS

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



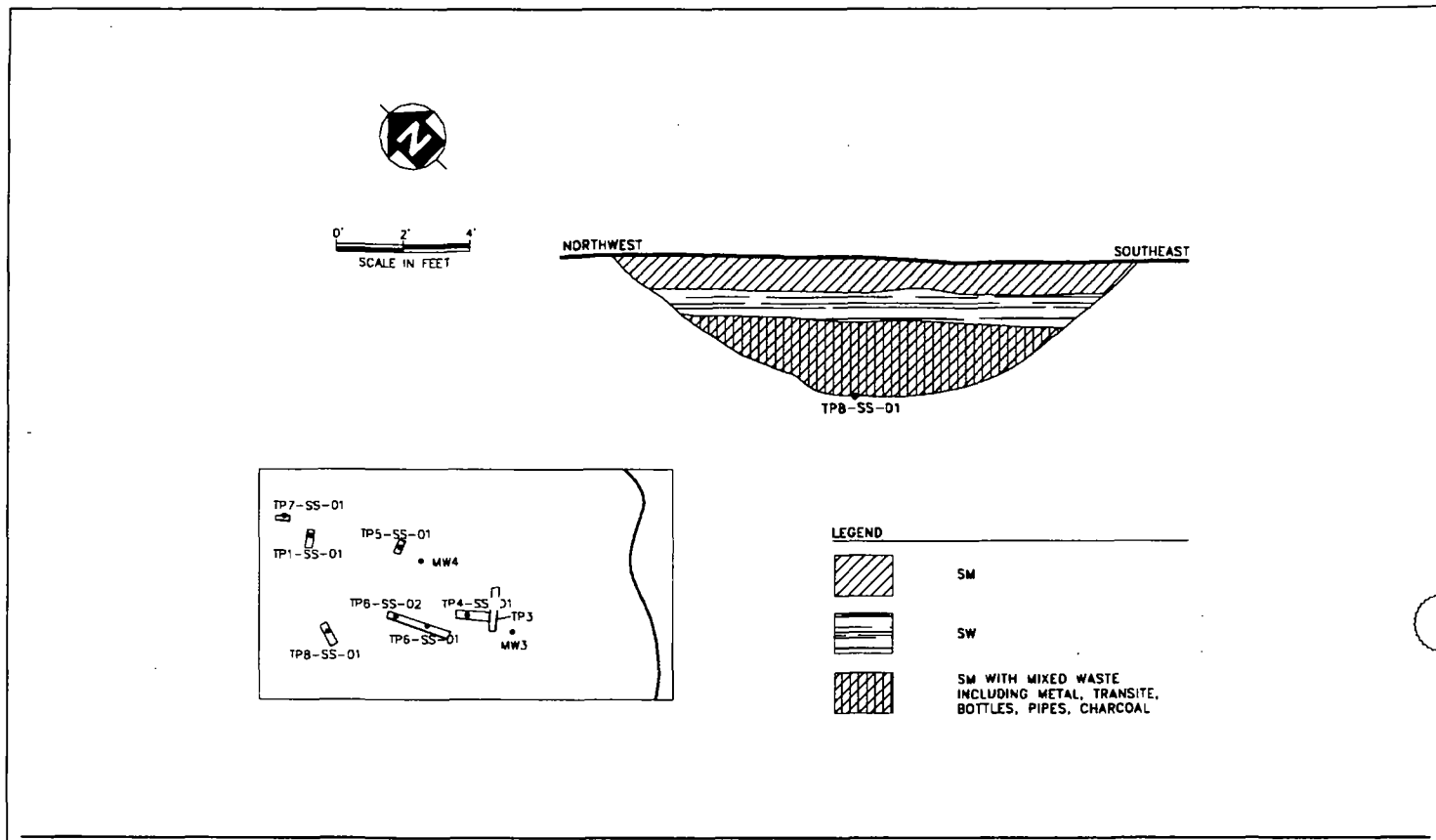
Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP8

Test Pit Location: South Central Landfill

Page 1 of 2

EXCAVATION DIAGRAM



Final Test Pit Dimensions (Sq.Ft.): 15' X 4' X 4' deep

Associated Photographs: 3-7 through 3-9

Grab Sample No. 8-20-98-BIL-TP8-SS-01

Time/Date Collected: 1450 / 8/20/98 Depth Collected: 4' Location: South Central Landfill

PID Reading: 0.0 USCS Designation: SM Soil Color: Brown-Dark Brown

Soil Description: Brown-Dark Brown silty, gravelly, sand (fines 10%, gravel 30%, sand 60%)
moist, dense, well graded.

Grab Sample No. _____

Time/Date Collected: _____ Depth Collected: _____ Location: _____

PID Reading: _____ USCS Designation: _____ Soil Color: _____

Soil Description: _____

Comments: Also collected asbestos sample: 8-20-98-ASB-03 - Dark gray transite collected at 1500.



Test Pit Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Test Pit No: TP8 Test Pit Location: South Central Landfill Page 2 of 2
Temperature: 70's Wind Speed: <5 mph Wind Direction: SE
General Weather Conditions: Partly cloudy Log Prepared By: Carlotta Cellucci

Soil Description

Depth Range: 0-1' BLS Soil Color: Brown USCS Designation: SM
PID Reading: 0.0 Description: Brown silty, gravelly, sand (fines 10%, gravel 25-30%, sand 60-65%)
dry, well graded, dense.

Depth Range: 1-2' BLS Soil Color: Gray USCS Designation: SW
PID Reading: 0.0 Description: Gray sand (100%), well graded, dry-moist, dense.

Depth Range: 2-4' BLS Soil Color: Brown-Dark Brown USCS Designation: SM
PID Reading: 0.0 Description: Brown-Dark Brown stained silty, gravelly, sand
(fines 10%, gravel/cobbles 25-30%, sand 60-65%), moist, well graded, dense with mixed waste including
charcoal, metal debris and pipes, glass and bottles, and transite.

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____

Depth Range: _____ Soil Color: _____ USCS Designation: _____
PID Reading: _____ Description: _____



Field Sampling Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Page 1 of 2

Temperature: Upper 70's Wind Speed: N/A Wind Direction: Variable
General Weather Conditions: Partly cloudy/sunny Log Prepared By: Paul Bean/Carlotta Cellucci

SAMPLES COLLECTED

Sample No: 8-18-98-BIL-BK1-SS-01 Date Collected: 8-18-98 Time Collected: 1222
Sample Location: BK1 Sample Depth Interval: 6-8" BLS
PID Reading: 0.0 USCS Designation: SM Soil Color: Brown
Soil Description: Silty, gravelly sand with cobbles (fines 15%, gravel/cobbles 20%, sand 65%),
very wet, loose, well graded.
Associated Photographs: Roll 1, photo 11 and 12 - sampling at BK1 background metals sample.

Comments: _____

Sample No: 8-18-98-BIL-BK3-SS-01 Date Collected: 8-18-98 Time Collected: 1255
Sample Location: BK3 Sample Depth Interval: 6-8" BLS
PID Reading: 0.0 USCS Designation: SM Soil Color: Brown
Soil Description: Brown, silty, gravelly sand (fines 10%, gravel 30%, sand 60%)
well graded, dry, dense, with some roots.
Associated Photographs: Roll 1, photo 13 - BK3 sample location.

Comments: _____

Sample No: 8-18-98-BIL-BK2-SS-01 Date Collected: 8-18-98 Time Collected: 1310
Sample Location: BK2 Sample Depth Interval: 6-7" BLS
PID Reading: 0.0 USCS Designation: ML Soil Color: Brown
Soil Description: Brown, sandy, gravelly silt (sand 10%, gravel 40%, fines 50%),
dry, well graded, very dense, with roots.
Associated Photographs: Roll 1, photo 14 - sample collection at BK2
Roll 1, photo 15 - BK2 sample location

Comments: _____



Field Sampling Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Page 2 of 2

Temperature: 60 Wind Speed: 0-5 mph Wind Direction: Variable
General Weather Conditions: Partly cloudy Log Prepared By: Carlotta Cellucci

SAMPLES COLLECTED

Sample No: 8-19-98-BIL-PW1-SS-01 Date Collected: 8-19-98 Time Collected: 0810
Sample Location: Adjacent to pesticide mixing pad Sample Depth Interval: 1' BLS
PID Reading: 1.5 (Background) USCS Designation: SM Soil Color: Brown
Soil Description: Brown, gravelly, silty, sand (gravel/cobbles 25%, fines 25%, sand 50%),
dry to moist, dense, well graded with some roots and organics.
Associated Photographs: 1-16 - sample collection at PW1 - sample location.

Comments: _____

Sample No: _____ Date Collected: _____ Time Collected: _____
Sample Location: _____ Sample Depth Interval: _____
PID Reading: _____ USCS Designation: _____ Soil Color: _____
Soil Description: _____
Associated Photographs: _____

Comments: _____

Sample No: _____ Date Collected: _____ Time Collected: _____
Sample Location: _____ Sample Depth Interval: _____
PID Reading: _____ USCS Designation: _____ Soil Color: _____
Soil Description: _____
Associated Photographs: _____

Comments: _____

APPENDIX G

GROUNDWATER WELL CONSTRUCTION, DEVELOPMENT, AND SAMPLING LOGS



Above-ground Monitoring Well Construction Log

Project Name: USCOE BRADFORD ISLAND

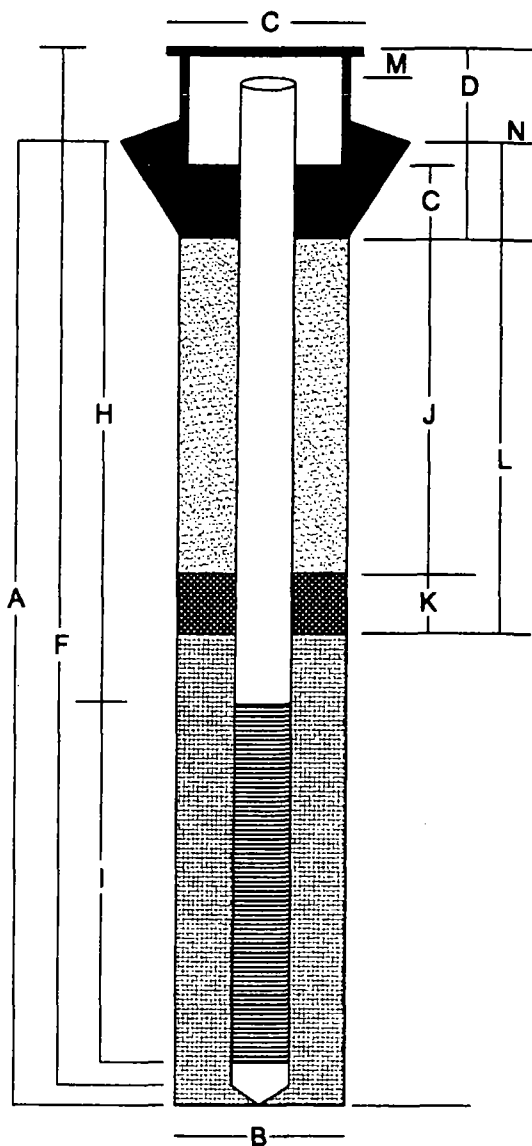
Well No.: MW01 (SBI)

Date: 8/17/98

Project No: 10022-03

Drilling Method: HSA

Geologist: Carlotta Cellucci

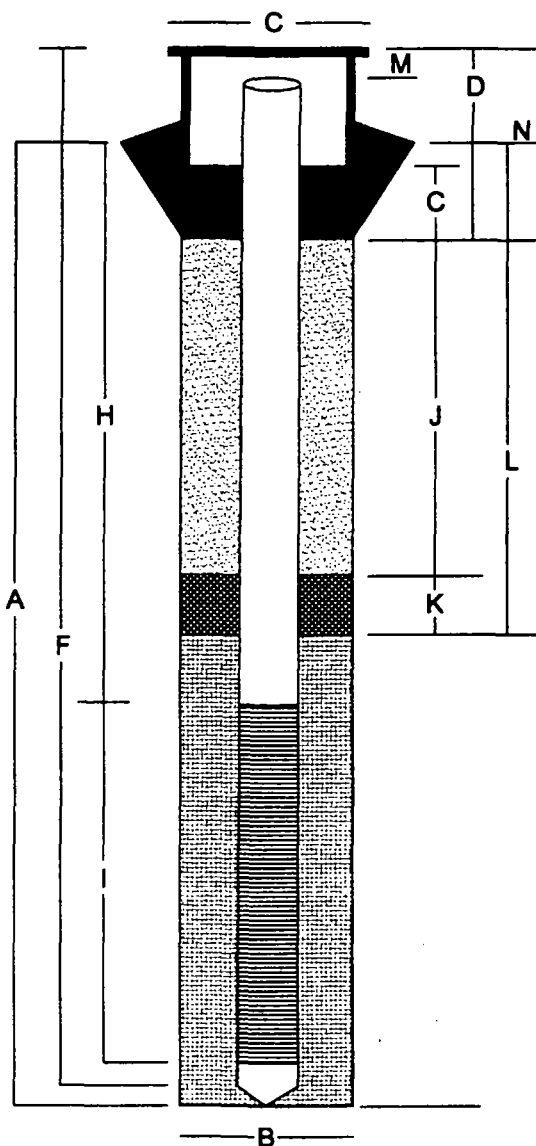


A: Total Boring Depth:	<u>30'</u>
B: Boring Diameter:	<u>9.25"</u>
C: Diameter of Protective Casing:	<u>5" ID</u>
D: Length of Protective Casing:	<u>5'</u>
Type of Protective Casing:	<u>Steel mountment</u>
E: Interval of Surface Grout:	<u>0-4'</u>
F: Total Riser Casing Length:	<u>31.4'</u>
Length of Sediment Sump:	<u>1"</u>
Casing Type:	<u>Sch. 80, Flush threaded PVC</u>
G: Inner Diameter:	<u>1.62" (2" OD)</u>
H: Depth to Screen:	<u>20'</u>
I: Screen Length:	<u>10'</u>
Screen Intrval:	<u>20'-30'</u>
Screen / Slot Type:	<u>0.010" Factory slot</u>
J: Depth to Top of Seal:	<u>4'</u>
K: Thickness of Seal:	<u>13'</u>
Type of seal material:	<u>Pure old medium Bentonite chips</u>
L: Depth to Top of Filter Pack:	<u>17'</u>
Type of Filter Pack:	<u>20/ 40 Colorado silica sand</u>
M: Top of Casing Elevation:	<u>105.50' above msl</u>
N: Surface Elevation:	<u>102.84' above msl</u>

NOTE: Well was not surged after placement of sand pack, because there was no water in the well.



Geologist: Carlotta Cellucci



- | | |
|-----------------------------------|----------------------------------|
| A: Total Boring Depth: | 32' |
| B: Boring Diameter: | 9.25" |
| C: Diameter of Protective Casing: | 5" ID |
| D: Length of Protective Casing: | 5' |
| Type of Protective Casing: | Steel mountment |
| E: Interval of Surface Grout: | 0-4' |
| F: Total Riser Casing Length: | 34.14' |
| Length of Sediment Sump: | 1" |
| Casing Type: | Sch. 80, Flush threaded PVC |
| G: Inner Diameter: | 1.62" (2" OD) |
| H: Depth to Screen: | 22' |
| I: Screen Length: | 10' |
| Screen Intrval: | 22'-32' |
| Screen / Slot Type: | 0.010" Factory slot |
| J: Depth to Top of Seal: | 4' |
| K: Thickness of Seal: | 16' |
| Type of seal material: | Pure qold medium Bentonite chips |
| L: Depth to Top of Filter Pack: | 20' |
| Type of Filter Pack: | 20/ 40 Colorado silica sand |
| M: Top of Casing Elevation: | 116.56' above msl |
| N: Surface Elevation: | 114.21' above msl |

NOTE: Well was not surged after placement of sand pack, because there was no water in the well at that time. Well was surged by hand prior to well development.



Above-ground Monitoring Well Construction Log

Project Name: USCOE BRADFORD ISLAND

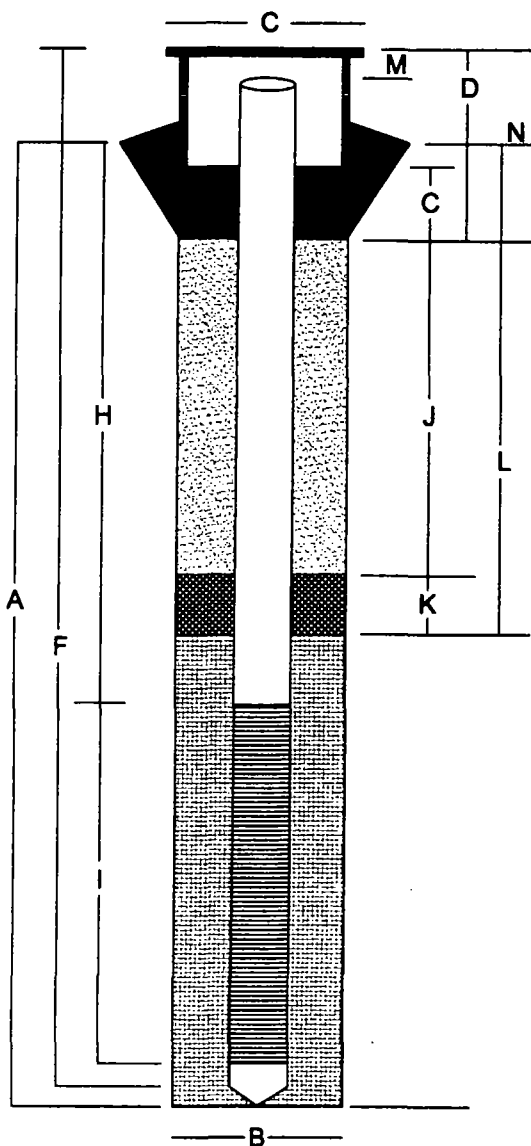
Well No.: MWO3 (SB4)

Date: 8/17/98

Project No: 10022-03

Drilling Method: HSA

Geologist: Carlotta Cellucci



A: Total Boring Depth:	<u>21'</u>
B: Boring Diameter:	<u>9.25"</u>
C: Diameter of Protective Casing:	<u>5" ID</u>
D: Length of Protective Casing:	<u>5'</u>
Type of Protective Casing:	<u>Steel manment</u>
E: Interval of Surface Grout:	<u>0-3'</u>
F: Total Riser Casing Length:	<u>22.57'</u>
Length of Sediment Sump:	<u>1"</u>
Casing Type:	<u>Sch. 80, Flush threaded PVC</u>
G: Inner Diameter:	<u>1.62" (2" OD)</u>
H: Depth to Screen:	<u>11'</u>
I: Screen Length:	<u>10'</u>
Screen Intvral:	<u>11'-21'</u>
Screen / Slot Type:	<u>0.010" Factory slot</u>
J: Depth to Top of Seal:	<u>3'</u>
K: Thickness of Seal:	<u>6'</u>
Type of seal material:	<u>Pure qld medium Bentonite chips</u>
L: Depth to Top of Filter Pack:	<u>9'</u>
Type of Filter Pack:	<u>20/ 40 Colorado silica sand</u>
M: Top of Casing Elevation:	<u>115.22' above msl</u>
N: Surface Elevation:	<u>112.99' above msl</u>

NOTE: After placement of sand pack, surged well for 5 minutes. Sand settled 4-inches. Replaced sand and surged again for 5 more minutes; sand did not settle.



Above-ground Monitoring Well Construction Log

Project Name: USCOE BRADFORD ISLAND

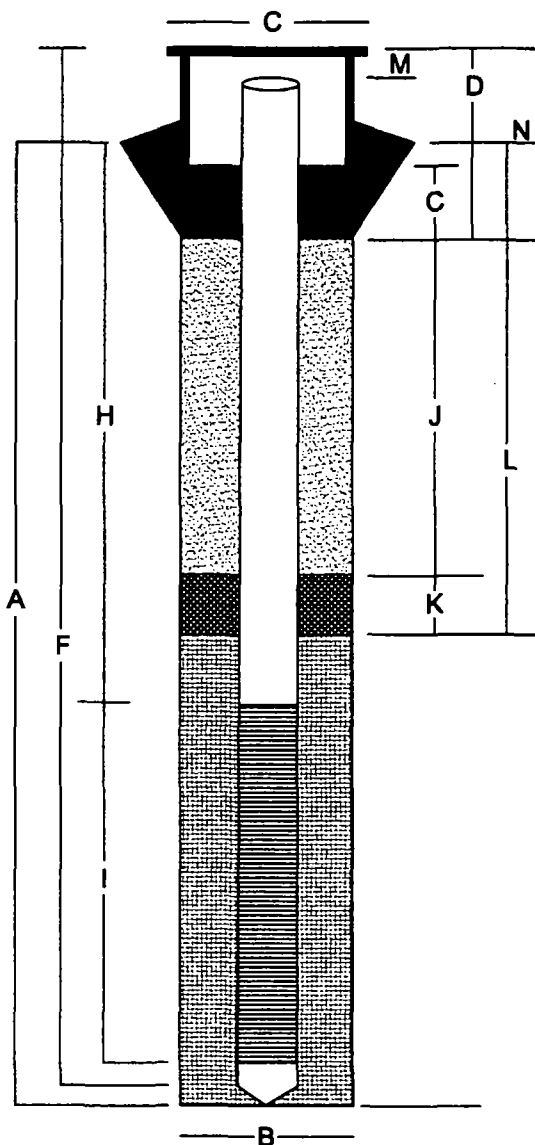
Well No.: MWO4 (SB5)

Date: 8/18/98

Project No: 10022-03

Drilling Method: HSA

Geologist: Carlotta Cellucci



A: Total Boring Depth:	<u>30'</u>
B: Boring Diameter:	<u>9.25"</u>
C: Diameter of Protective Casing:	<u>5"</u>
D: Length of Protective Casing:	<u>5'</u>
Type of Protective Casing:	<u>Steel mountment</u>
E: Interval of Surface Grout:	<u>0-4'</u>
F: Total Riser Casing Length:	<u>31.85'</u>
Length of Sediment Sump:	<u>1"</u>
Casing Type:	<u>Sch. 80, Flush threaded PVC</u>
G: Inner Diameter:	<u>1.62" (2" OD)</u>
H: Depth to Screen:	<u>10'</u>
I: Screen Length:	<u>20'</u>
Screen Intrval:	<u>10'-30'</u>
Screen / Slot Type:	<u>0.010" Factory slot</u>
J: Depth to Top of Seal:	<u>4'</u>
K: Thickness of Seal:	<u>4'</u>
Type of seal material:	<u>Pure old medium Bentonite chips</u>
L: Depth to Top of Filter Pack:	<u>8'</u>
Type of Filter Pack:	<u>20/ 40 Colorado silica sand</u>
M: Top of Casing Elevation:	<u>114.79' above msl</u>
N: Surface Elevation:	<u>114.47' above msl</u>

NOTE: After placement of sand pack, surged well for 5 minutes. Sand settled 1' inch. Replaced sand and surged again for 5 more minutes; sand did not settle.



Well Development Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Monitoring Well No.: MW-2 Development Date: 8-19-98 Page 1 of 1
Development personnel: Paul Bunn Total Development Time: 2 hrs.
Weather Conditions: Sunny, upper 70's

EVACUATION DATA

Measuring Point: TBC Casing Diameter: 2"
Total Depth of Well: 34.15 Total Gallons Purged for Development: 8
Static Water Level: 29.10 Color: tan
Height of Water Column: 5.05 Odor: none
Gallons per Foot: 0.16 Appearance: cloudy
One Casing Volume: 0.80
Evacuation Method/Equipment: disposable barrel

PARAMETER MEASUREMENT EVENTS

Number of Casing Volumes	Gallons Purged	Turbidity
<u>1</u> <u>pull</u>	<u>1</u>	<u>7200</u>
<u>2</u> <u>Purged dry at</u>	<u>2</u>	<u>7200</u>
<u>3</u> <u>2.5 gallons</u>	<u>3</u>	<u>189.9</u>
<u>4</u>	<u>4</u>	<u>190.8</u>
<u>5</u> <u>Purged dry at</u>	<u>5</u>	<u>190.0</u>
<u>6</u> <u>5.0 gallons</u>	<u>6</u>	<u>191.0</u>
<u>7</u> <u>Purged dry</u>	<u>7</u>	<u>191.1</u>
<u>8</u> <u>at 7.5 gallons</u>	<u>8</u>	<u>191.1</u>

Well Casing Volumes

GAL/FT

1.25" = 0.077

1.5" = 0.10

2" = 0.16
4" = 0.65

2.5" = 0.24
6" = 1.46

3" = 0.37

3.5" = 0.50



Well Development Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Monitoring Well No.: MW-3 Development Date: 8-19-98 Page 1 of 2
Development personnel: Paul Brown Total Development Time: 3 hrs.
Weather Conditions: Sunny, upper 70's

EVACUATION DATA

Measuring Point: TOC Casing Diameter: 2"
Total Depth of Well: 22.57 Total Gallons Purged for Development: 605
Static Water Level: 17.67 Color: fair
Height of Water Column: 4.90 Odor: none
Gallons per Foot: 0.16 Appearance: cloudy
One Casing Volume: 0.80
Evacuation Method/Equipment: disposable boiler

PARAMETER MEASUREMENT EVENTS

Number of Casing Volumes	Gallons Purged	Turbidity
<u>1</u>	<u>1</u>	<u>>200</u>
<u>2</u>	<u>2</u>	<u>>200</u>
<u>3</u>	<u>3</u>	<u>>200</u>
<u>4</u>	<u>4</u>	<u>>200</u>
<u>5</u>	<u>5</u>	<u>>200</u>
<u>20</u>	<u>20</u>	<u>>200</u>
<u>25</u>	<u>25</u>	<u>>200</u>
<u>30</u>	<u>30</u>	<u>>200</u>
<u>35</u>	<u>35</u>	<u>192.5</u>
<u>40</u>	<u>40</u>	<u>192.3</u>
<u>45</u>	<u>45</u>	<u>>200</u>

Well Casing Volumes

GAL/FT

1.25" = 0.077

1.5" = 0.10

2" = 0.16
4" = 0.65

2.5" = 0.24
6" = 1.46

3" = 0.37

3.5" = 0.50



Well Development Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Page 2 of 2

Monitoring Well No.: MW-3

Development Date: _____

Development personnel: _____

Total Development Time: _____

Weather Conditions: _____

EVACUATION DATA

Measuring Point: _____

Casing Diameter: _____

Total Depth of Well: _____

Total Gallons Purged for Development: _____

Static Water Level: _____

Color: _____

Height of Water Column: _____

Odor: _____

Gallons per Foot: _____

Appearance: _____

One Casing Volume: _____

Evacuation Method/Equipment: _____

PARAMETER MEASUREMENT EVENTS

Number of Casing Volumes

Gallons Purged

Turbidity

50

50

7200

55

55

197.0

60

60

196.5

61

61

188.2

62

62

188.3

63

63

188.1

64

64

188.6

65

65

188.3

Well Casing Volumes

GAL/FT

1.25" = 0.077

1.5" = 0.10

2" = 0.16
4" = 0.65

2.5" = 0.24
6" = 1.46

3" = 0.37

3.5" = 0.50



Well Development Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

Monitoring Well No.: MW-4 Development Date: 8-20-98 Page 1 of 1
Development personnel: Paul Brown Total Development Time: 4 hrs
Weather Conditions: Partly Cloudy; low 70's

EVACUATION DATA

Measuring Point: TOC Casing Diameter: 2"
Total Depth of Well: 31.82 Total Gallons Purged for Development: 46
Static Water Level: 17.25 Color: brownish
Height of Water Column: 14.57 Odor: none
Gallons per Foot: 8.16 Appearance: cloudy
One Casing Volume: 2.33
Evacuation Method/Equipment: disposable bailer

PARAMETER MEASUREMENT EVENTS

Number of Casing Volumes	Gallons Purged	Turbidity
<u>1</u>	<u>2.5</u>	<u>>200</u>
<u>2</u>	<u>5.0</u>	<u>>200</u>
<u>3</u>	<u>7.5</u>	<u>>200</u>
<u>4</u> Purged dry at 40 gallons	<u>10.0</u>	<u>>200</u>
<u>6</u>	<u>15.0</u>	<u>>200</u>
<u>8</u> Purged dry at 8.0 gallons	<u>20.0</u>	<u>>200</u>
<u>14.4</u> * will repeatedly purges dry after approx. 4 gallons	<u>36.0</u>	<u>82.6</u>
<u>15.4</u>	<u>38.5</u>	<u>86.5</u>
<u>16.4</u>	<u>41.0</u>	<u>86.3</u>
<u>17.4</u>	<u>43.5</u>	<u>86.1</u>
<u>19.4</u>	<u>46.0</u>	<u>85.9</u>

Well Casing Volumes

GAL/FT

1.25" = 0.077

1.5" = 0.10

2" = 0.16
4" = 0.63

2.5" = 0.24
6" = 1.46

3" = 0.37

3.5" = 0.50

**Groundwater Sampling Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03**

090298-BIL-
Sample No.: MW2-5W-01

Sample Location: MW-2

Page 1 of 1
Sampling Date: 9-2-98

Sampling personnel: Rossford, P. Bean, S. Henderson

Sampling Time: 0745

Weather Conditions: Sunny, 90°F, Wind light & variable

EVACUATION DATA

Measuring Point: TDC

Height Above/Below Reference Surface: _____

Total Depth of Well: 34.48

Reference Surface: ToC

Static Water Level: 10.82

Photoionization Detector Reading: 4.8

Height of Water Column: 23.66

Thickness of Floating Product: None

Gallons per Foot: 0.16

Casing Diameter: 2"

One Casing Volume: 3.78

Gallons Purged prior to Sampling: 212

Evacuation Method/Equipment: Disposable bailer

GROUNDWATER QUALITY DATA

Color: v. light brown
to grey

Odor: none

Appearance: Slightly Cloudy

PARAMETER MEASUREMENT EVENTS

	<u>Initial</u>	<u>No. 1</u>	<u>No. 2</u>	<u>No. 3</u>	<u>No. 4</u>	<u>Sample</u>
Gallons Purged:	<u>0</u>	<u>4</u>	<u>8</u>	<u>12</u>	<u>Sample</u>	
Temperature:	<u>67.2</u>	<u>63.1</u>	<u>61.6</u>	<u>61.1</u>	<u>59.3</u>	
pH:	<u>7.51</u>	<u>8.14</u>	<u>8.46</u>	<u>8.34</u>	<u>8.12</u>	
Conductivity:	<u>117</u>	<u>144</u>	<u>167</u>	<u>163</u>	<u>179</u>	
Salinity:						
Turbidity:	<u>118</u>	<u>113</u>	<u>411</u>	<u>390</u>	<u>159</u>	

Comments: well purged dry after 25 gallons removed (water level at 24.4 ft Perzaltic could not pump up water. Skipped and sampled w/ baster after purged out 12 gallons.

Well Casing Volumes

GAL/PT

 $1.25^{\circ} = 0.077$ $1.5'' = 0.10$
$$2^\circ = 0.16$$
$$4^\circ = 0.65$$
$$2.5^\circ = 0.24$$
$$6^\circ = 1.46$$
 $3'' = 0.37$

3.5" - 0.50

Will recover to 30.29 ft after ~ 1.5 hrs.
Well purged dry at ~ 12 gallons
Rate of recovery = $0.02 \text{ ft}/125 \text{ sec.}$



Groundwater Sampling Log
Site Inspection
Former Bradford Island Landfill Site
Cascade Locks, Oregon
TC-10022-03

090198-BIL-
Sample No. MW 3-5W-01 Sample Location: MW-3 Sampling Date: 9-1-98 Page 1 of 1
Sampling personnel: P. Oswood, P. Bean, S. Henderson Sampling Time: 1900
Weather Conditions: Sunny, 80° F

EVACUATION DATA

Measuring Point: TOC Height Above/Below Reference Surface: _____
Total Depth of Well: 22.84 Reference Surface: TOC
Static Water Level: 17.82 Photoionization Detector Reading: 24.0
Height of Water Column: 5.02 Thickness of Floating Product: none
Gallons per Foot: 0.16 Casing Diameter: 2"
One Casing Volume: 0.80 Gallons Purged prior to Sampling: 3.0
Evacuation Method/Equipment: Peristaltic pump

GROUNDWATER QUALITY DATA

Color: clear Odor: none Appearance: transparent

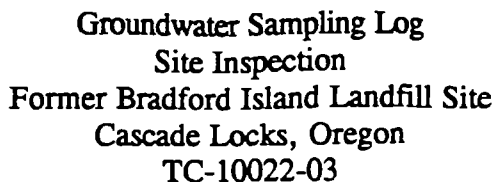
PARAMETER MEASUREMENT EVENTS

	<u>Initial</u>	<u>No. 1</u>	<u>No. 2</u>	<u>No. 3</u>	<u>No. 4</u>	<u>Sample</u>
Gallons Purged:	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	_____	_____
Temperature:	<u>63.9</u>	<u>64.3</u>	<u>62.7</u>	<u>62.5</u>	_____	_____
pH:	<u>8.29</u>	<u>8.56</u>	<u>8.78</u>	<u>9.81</u>	_____	_____
Conductivity:	<u>116</u>	<u>121</u>	<u>167</u>	<u>165</u>	_____	_____
Salinity:	_____	_____	_____	_____	_____	_____
Turbidity:	<u>14</u>	<u>50</u>	<u>0.90</u>	<u>1.1</u>	_____	_____

Comments: _____

Well Casing Volumes

GAL/FT	1.25" = 0.077	1.5" = 0.10	2" = 0.16	2.5" = 0.24	3" = 0.37	3.5" = 0.50
			4" = 0.65	6" = 1.46		



090198-BIL- Page 1 of 1

Sample No.: MW4-5W-01 Sample Location: MW-4 Sampling Date: 9-1-98

Sampling personnel: R. Osgood, P. Bean, S. Henderson Sampling Time: 2030

Weather Conditions: Sunny, 90°F

Measuring Point:	<u>TOC</u>	Height Above/Below Reference Surface:	<u> </u>
Total Depth of Well:	<u>32.15</u>	Reference Surface:	<u>TOC</u>
Static Water Level:	<u>17.38</u>	Photoionization Detector Reading:	<u>12.1</u>
Height of Water Column:	<u>14.77</u>	Thickness of Floating Product:	<u>None</u>
Gallons per Foot:	<u>0.36</u>	Casing Diameter:	<u>2"</u>
One Casing Volume:	<u>2.36</u>	Gallons Purged prior to Sampling:	<u>7.0</u>
Evacuation Method/Equipment:	<u>Purged well with bailer & sampled with peristaltic pump</u>		

Color: v. light gray Odor: none Appearance: slightly cloudy

	<u>Initial</u>	<u>No. 1</u>	<u>No. 2</u>	<u>No. 3</u>	<u>No. 4</u>	<u>Sample</u>
Gallons Purged:	<u>0</u>	<u>2.5</u>	<u>5.0</u>	<u>7.0 (After Recovery)</u>		
Temperature:	<u>61.6</u>	<u>60.2</u>	<u>59.9</u>	<u>63.4</u>		
pH:	<u>6.90</u>	<u>6.85</u>	<u>5.68</u>	<u>6.27</u>		
Conductivity:	<u>429</u>	<u>425</u>	<u>429</u>	<u>441</u>		
Salinity:						
Turbidity:	<u>21</u>	<u>80</u>	<u>850</u>	<u>120</u>		

Comments: well purged dry at approx. 7.0 gallons @ 1950
recovery = 0.1 ft / 10 sec.

Well Casing Volumes

GAL/FT

 $1.25^\circ = 0.077$ $1.5^\circ = 0.10$
$$\begin{aligned} 2^\circ &= 0.16 \\ 4^\circ &= 0.65 \end{aligned}$$
$$\begin{aligned} 2.5^\circ &= 0.24 \\ 6^\circ &= 1.46 \end{aligned}$$
 $3'' = 0.37$ $3.5^\circ = 0.50$

* Collected RA sample
Blind duplicate 090198-BIL-mw5-BW-01 w/ hls time of 1700

APPENDIX H

LABORATORY ANALYTICAL REPORT



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
8-17-98-BIL-SB1-SS-01	B808411-01	Soil	8/17/98
8-18-98-BIL-BK1-SS-01	B808411-02	Soil	8/18/98
8-18-98-BIL-BK2-SS-01	B808411-03	Soil	8/18/98
8-18-98-BIL-BK3-SS-01	B808411-04	Soil	8/18/98
8-19-98-BIL-PW1-SS-01	B808411-05	Soil	8/19/98
8-19-98-BIL-TP1-SS-01	B808411-06	Soil	8/19/98
8-19-98-BIL-TP2-SS-01	B808411-07	Soil	8/19/98
8-19-98-BIL-TP4-SS-01	B808411-08	Soil	8/19/98
8-20-98-BIL-TP6-SS-01	B808411-09	Soil	8/20/98
8-20-98-BIL-TP6-SS-02	B808411-10	Soil	8/20/98
8-20-98-BIL-TP5-SS-01	B808411-11	Soil	8/20/98
8-20-98-BIL-TP8-SS-01	B808411-12	Soil	8/20/98
8-20-98-BIL-TP7-SS-01	B808411-13	Soil	8/20/98
8-20-98-BIL-TP9-SS-01	B808411-14	Soil	8/20/98

Creek Analytical - Bothell

*The results in this report apply to the samples analyzed in accordance with the chain of custody document.
This analytical report must be reproduced in its entirety.*

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 1 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SBI-SS-01		B808411-01		Soil				
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		95.2	%	
8-19-98-BIL-PW1-SS-01		B808411-05		Soil				
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		97.9	%	
8-19-98-BIL-TP1-SS-01		B808411-06		Soil				
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	DET	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		96.0	%	
8-19-98-BIL-TP2-SS-01		B808411-07		Soil				
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		96.2	%	
8-19-98-BIL-TP4-SS-01		B808411-08		Soil				
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 2 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01 (continued)				B808411-08		Soil		
Diesel Range Hydrocarbons	0880628	8/24/98	8/25/98		50.0	ND	mg/kg dry	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		98.7	%	
8-20-98-BIL-TP6-SS-01				B808411-09		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		99.6	%	
8-20-98-BIL-TP6-SS-02				B808411-10		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		101	%	
8-20-98-BIL-TP5-SS-01				B808411-11		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	DET	"	
Diesel Range Hydrocarbons	"	"	"		50.0	DET	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		101	%	
8-20-98-BIL-TP8-SS-01				B808411-12		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01 (continued)								
				B808411-12		Soil		
Heavy Fuel Oil Range Hydrocarbons	0880628	8/24/98	8/25/98		100	ND	mg/kg dry	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		99.5	%	
8-20-98-BIL-TP7-SS-01								
				B808411-13		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	ND	"	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		73.4	%	
8-20-98-BIL-TP9-SS-01								
				B808411-14		Soil		
Gx Range Hydrocarbons	0880628	8/24/98	8/25/98		20.0	ND	mg/kg dry	
Kerosene Range Hydrocarbons	"	"	"		50.0	DET	"	
Diesel Range Hydrocarbons	"	"	"		50.0	DET	"	
Insulating Oil Range Hydrocarbons	"	"	"		100	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		100	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		100	DET	"	
Surrogate: 2-FBP	"	"	"	50.0-150		85.6	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP1-SS-01								
				B808411-06			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/28/98		50.0	920	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		125	2360	"	
Surrogate: 2-FBP	"	"	"	50.0-150		77.6	%	
8-19-98-BIL-TP2-SS-01								
				B808411-07			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/28/98		10.0	132	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		25.0	342	"	
Surrogate: 2-FBP	"	"	"	50.0-150		108	%	
8-19-98-BIL-TP4-SS-01								
				B808411-08			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	9/1/98		10.0	27.4	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		25.0	136	"	
Surrogate: 2-FBP	"	"	"	50.0-150		105	%	
8-20-98-BIL-TP6-SS-01								
				B808411-09			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/28/98		50.0	1880	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		125	4040	"	
Surrogate: 2-FBP	"	"	"	50.0-150		102	%	
8-20-98-BIL-TP6-SS-02								
				B808411-10			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/31/98		10.0	81.9	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		25.0	533	"	
Surrogate: 2-FBP	"	"	"	50.0-150		101	%	
8-20-98-BIL-TP5-SS-01								
				B808411-11			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	9/1/98		50.0	9780	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		125	20200	"	
Surrogate: 2-FBP	"	"	"	50.0-150		117	%	
8-20-98-BIL-TP8-SS-01								
				B808411-12			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/31/98		10.0	202	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		25.0	951	"	
Surrogate: 2-FBP	"	"	"	50.0-150		108	%	
8-20-98-BIL-TP7-SS-01								
				B808411-13			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	9/1/98		110	1900	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		275	2790	"	
Surrogate: 2-FBP	"	"	"	50.0-150		92.4	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 5 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	
Diesel Range Hydrocarbons	0880788	8/27/98	8/31/98		110	8700	mg/kg dry	1
Lube Oil Range Hydrocarbons	"	"	"		275	31400	"	
Surrogate: 2-FBP	"	"	"	50.0-150		102	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/25/98 13:58
--	---	---

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-18-98-BIL-BK1-SS-01			B808411-02				Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	12000	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	6180	"	
Iron	"	"	"	EPA 6010B	8.00	18900	"	
Magnesium	"	"	"	EPA 6010B	10.0	7090	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	295	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	ND	"	
Arsenic	"	"	"	EPA 6020	0.500	2.77	"	
Barium	"	"	"	EPA 6020	5.00	77.0	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	ND	"	
Chromium	"	"	"	EPA 6020	0.500	11.9	"	
Cobalt	"	"	"	EPA 6020	0.500	11.4	"	
Copper	"	"	"	EPA 6020	0.500	45.0	"	
Lead	"	"	"	EPA 6020	0.500	14.2	"	
Manganese	"	"	"	EPA 6020	1.00	368	"	
Nickel	"	"	"	EPA 6020	0.500	16.3	"	
Selenium	"	"	"	EPA 6020	0.500	0.801	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	42.2	"	
Zinc	"	"	"	EPA 6020	5.00	53.6	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.100	0.101	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	242	"	
8-18-98-BIL-BK2-SS-01			B808411-03				Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	19500	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	8030	"	
Iron	"	"	"	EPA 6010B	8.00	25600	"	
Magnesium	"	"	"	EPA 6010B	10.0	11700	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	393	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	ND	"	
Arsenic	"	"	"	EPA 6020	0.500	3.24	"	
Barium	"	"	"	EPA 6020	5.00	95.5	"	
Beryllium	"	"	"	EPA 6020	0.500	0.554	"	
Cadmium	"	"	"	EPA 6020	0.500	0.575	"	
Chromium	"	"	"	EPA 6020	2.50	19.2	"	
Cobalt	"	"	"	EPA 6020	2.50	18.9	"	
Copper	"	"	"	EPA 6020	2.50	49.9	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 7 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-18-98-BIL-BK2-SS-01 (continued)				B808411-03			Soil	
Lead	0980038	9/1/98	9/3/98	EPA 6020	0.500	18.7	mg/kg dry	
Manganese	"	"	"	EPA 6020	2.50	610	"	
Nickel	"	"	"	EPA 6020	2.50	24.2	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	2.50	61.5	"	
Zinc	"	"	"	EPA 6020	5.00	55.9	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.100	ND	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	751	"	
8-18-98-BIL-BK3-SS-01				B808411-04			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	20200	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	7890	"	
Iron	"	"	"	EPA 6010B	8.00	28300	"	
Magnesium	"	"	"	EPA 6010B	10.0	15900	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	239	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	ND	"	
Arsenic	"	"	"	EPA 6020	0.500	2.92	"	
Barium	"	"	"	EPA 6020	5.00	139	"	
Beryllium	"	"	"	EPA 6020	0.500	0.622	"	
Cadmium	"	"	"	EPA 6020	0.500	ND	"	
Chromium	"	"	"	EPA 6020	0.500	21.3	"	
Cobalt	"	"	"	EPA 6020	0.500	17.5	"	
Copper	"	"	"	EPA 6020	0.500	53.6	"	
Lead	"	"	"	EPA 6020	0.500	8.67	"	
Manganese	"	"	"	EPA 6020	1.00	460	"	
Nickel	"	"	"	EPA 6020	0.500	19.2	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	73.0	"	
Zinc	"	"	"	EPA 6020	5.00	60.4	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.100	ND	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	507	"	
8-19-98-BIL-TPI-SS-01				B808411-06			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	16600	mg/kg dry	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 8 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP1-SS-01 (continued)				B808411-06			Soil	
Calcium	0980293	9/11/98	9/10/98	EPA 6010B	15.0	9740	mg/kg dry	
Iron	"	"	9/18/98	EPA 6010B	32.0	52700	"	
Magnesium	"	"	9/10/98	EPA 6010B	10.0	5180	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	471	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	4.49	"	
Arsenic	"	"	"	EPA 6020	0.500	9.73	"	
Barium	"	"	"	EPA 6020	250	567	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	195	"	
Chromium	"	"	"	EPA 6020	0.500	60.1	"	
Cobalt	"	"	"	EPA 6020	0.500	17.2	"	
Copper	"	"	"	EPA 6020	25.0	1620	"	
Lead	"	"	"	EPA 6020	25.0	7140	"	
Manganese	"	"	"	EPA 6020	25.0	1830	"	
Nickel	"	"	"	EPA 6020	0.500	84.0	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	46.0	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	26.9	"	
Zinc	"	"	"	EPA 6020	250	8650	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.500	1.61	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	788	"	
8-19-98-BIL-TP4-SS-01				B808411-08			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	11200	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	6610	"	
Iron	"	"	"	EPA 6010B	8.00	21500	"	
Magnesium	"	"	"	EPA 6010B	10.0	7070	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	585	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	ND	"	
Arsenic	"	"	"	EPA 6020	0.500	2.18	"	
Barium	"	"	"	EPA 6020	5.00	84.6	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	ND	"	
Chromium	"	"	"	EPA 6020	0.500	9.12	"	
Cobalt	"	"	"	EPA 6020	0.500	8.28	"	
Copper	"	"	"	EPA 6020	0.500	28.5	"	
Lead	"	"	"	EPA 6020	0.500	189	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 9 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01 (continued)				B808411-08			Soil	
Manganese	0980038	9/1/98	9/3/98	EPA 6020	1.00	273	mg/kg dry	
Nickel	"	"	"	EPA 6020	0.500	14.0	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	34.3	"	
Zinc	"	"	"	EPA 6020	5.00	57.9	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.100	ND	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	723	"	
8-20-98-BIL-TP6-SS-01				B808411-09			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	16000	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	8870	"	
Iron	"	"	"	EPA 6010B	8.00	22400	"	
Magnesium	"	"	"	EPA 6010B	10.0	7840	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	570	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	ND	"	
Arsenic	"	"	"	EPA 6020	0.500	1.75	"	
Barium	"	"	"	EPA 6020	5.00	87.6	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	1.60	"	
Chromium	"	"	"	EPA 6020	0.500	9.34	"	
Cobalt	"	"	"	EPA 6020	0.500	7.92	"	
Copper	"	"	"	EPA 6020	0.500	53.0	"	
Lead	"	"	"	EPA 6020	2.50	1120	"	
Manganese	"	"	"	EPA 6020	0.500	211	"	
Nickel	"	"	"	EPA 6020	0.500	20.4	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	31.5	"	
Zinc	"	"	"	EPA 6020	5.00	130	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.100	ND	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	688	"	
8-20-98-BIL-TP5-SS-01				B808411-11			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	12600	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	5050	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 10 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01 (continued)				B808411-11			Soil	
Iron	0980293	9/11/98	9/10/98	EPA 6010B	8.00	18100	mg/kg dry	
Magnesium	"	"	"	EPA 6010B	10.0	5860	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	404	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	0.874	"	
Arsenic	"	"	"	EPA 6020	0.500	3.04	"	
Barium	"	"	"	EPA 6020	5.00	136	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	4.54	"	
Chromium	"	"	"	EPA 6020	0.500	14.0	"	
Cobalt	"	"	"	EPA 6020	0.500	9.02	"	
Copper	"	"	"	EPA 6020	0.500	55.1	"	
Lead	"	"	"	EPA 6020	0.500	193	"	
Manganese	"	"	"	EPA 6020	2.50	362	"	
Nickel	"	"	"	EPA 6020	0.500	17.7	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	40.9	"	
Zinc	"	"	"	EPA 6020	5.00	114	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.500	1.66	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	1100	"	
8-20-98-BIL-TP8-SS-01				B808411-12			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	9020	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	6830	"	
Iron	"	"	"	EPA 6010B	8.00	16900	"	
Magnesium	"	"	"	EPA 6010B	10.0	5840	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	433	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	3.05	"	
Arsenic	"	"	"	EPA 6020	0.500	5.35	"	
Barium	"	"	"	EPA 6020	5.00	156	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	5.03	"	
Chromium	"	"	"	EPA 6020	0.500	13.5	"	
Cobalt	"	"	"	EPA 6020	0.500	10.7	"	
Copper	"	"	"	EPA 6020	0.500	204	"	
Lead	"	"	"	EPA 6020	2.50	403	"	
Manganese	"	"	"	EPA 6020	2.50	381	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 11 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01 (continued)				B808411-12			Soil	
Nickel	0980038	9/1/98	9/3/98	EPA 6020	0.500	21.3	mg/kg dry	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	12.0	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	37.1	"	
Zinc	"	"	"	EPA 6020	25.0	381	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.500	3.50	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	689	"	
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	
Aluminum	0980293	9/11/98	9/10/98	EPA 6010B	10.0	13200	mg/kg dry	
Calcium	"	"	"	EPA 6010B	15.0	5420	"	
Iron	"	"	"	EPA 6010B	8.00	22300	"	
Magnesium	"	"	"	EPA 6010B	10.0	5660	"	
Sodium	"	"	9/17/98	EPA 6010B	25.0	344	"	
Antimony	0980038	9/1/98	9/3/98	EPA 6020	0.500	1.16	"	
Arsenic	"	"	"	EPA 6020	0.500	2.11	"	
Barium	"	"	"	EPA 6020	5.00	98.3	"	
Beryllium	"	"	"	EPA 6020	0.500	ND	"	
Cadmium	"	"	"	EPA 6020	0.500	3.55	"	
Chromium	"	"	"	EPA 6020	0.500	12.6	"	
Cobalt	"	"	"	EPA 6020	0.500	7.93	"	
Copper	"	"	"	EPA 6020	0.500	44.7	"	
Lead	"	"	"	EPA 6020	0.500	151	"	
Manganese	"	"	"	EPA 6020	2.50	290	"	
Nickel	"	"	"	EPA 6020	0.500	15.3	"	
Selenium	"	"	"	EPA 6020	0.500	ND	"	
Silver	"	"	"	EPA 6020	0.500	ND	"	
Thallium	"	"	"	EPA 6020	0.500	ND	"	
Vanadium	"	"	"	EPA 6020	0.500	38.3	"	
Zinc	"	"	"	EPA 6020	5.00	85.7	"	
Mercury	0980054	9/2/98	"	EPA 7471A	0.500	3.52	"	
Potassium	0980564	9/9/98	9/10/98	EPA 6010B	10.0	820	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SB1-SS-01				B808411-01			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	10.2	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	5.55	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	0.0120	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	0.0350	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	21.6	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	14.5	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.340	"	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	1.78	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	64.1	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	0.00162	"	
8-18-98-BIL-BK2-SS-01				B808411-03			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	7.90	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	2.71	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	ND	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	ND	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	10.6	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	3.81	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 13 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-18-98-BIL-BK2-SS-01 (continued)				B808411-03			Soil	
Manganese	0980288	9/9/98	9/15/98	EPA 6020	0.00500	0.0546	mg/l	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	0.207	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	61.2	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	ND	"	
8-18-98-BIL-BK3-SS-01				B808411-04			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	6.75	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	2.38	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	0.0110	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	ND	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	10.3	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	4.39	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.0586	"	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	ND	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	61.8	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	ND	"	
8-19-98-BIL-PW1-SS-01				B808411-05			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	5.18	mg/l	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 14 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PW1-SS-01 (continued)				B808411-05			Soil	
Antimony	0980288	9/9/98	9/17/98	EPA 6020	0.100	ND	mg/l	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	2.03	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	ND	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	ND	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	8.81	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	4.16	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.0994	"	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	0.472	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	64.3	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	ND	"	
8-19-98-BIL-TP2-SS-01				B808411-07			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	2.21	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	9.50	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	ND	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	ND	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	4.64	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	2.40	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.0343	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 15 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01 (continued)				B808411-07			Soil	
Nickel	0980288	9/9/98	9/15/98	EPA 6020	0.0300	ND	mg/l	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	ND	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	45.8	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	ND	"	
8-20-98-BIL-TP6-SS-02				B808411-10			Soil	
Aluminum	0980291	9/9/98	9/10/98	EPA 6010B	0.500	5.61	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	
Arsenic	"	"	9/15/98	EPA 6020	0.200	ND	"	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/17/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/10/98	EPA 6010B	0.250	1.85	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	ND	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	0.0302	"	
Iron	0980291	"	9/10/98	EPA 6010B	0.150	8.73	"	
Lead	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Magnesium	0980291	"	9/10/98	EPA 6010B	0.500	2.22	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.144	"	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/10/98	EPA 6010B	0.200	0.394	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/10/98	EPA 6010B	0.500	43.5	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	0.0746	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	0.00196	"	
8-20-98-BIL-TP7-SS-01				B808411-13			Soil	
Aluminum	0980291	9/9/98	9/11/98	EPA 6010B	0.500	2.06	mg/l	
Antimony	0980288	"	9/17/98	EPA 6020	0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 16 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01 (continued)				B808411-13			Soil	
Arsenic	0980288	9/9/98	9/15/98	EPA 6020	0.200	ND	mg/l	
Barium	"	"	"	EPA 6020	1.00	ND	"	
Beryllium	"	"	9/18/98	EPA 6020	0.00500	ND	"	
Cadmium	"	"	9/15/98	EPA 6020	0.00500	ND	"	
Calcium	0980291	"	9/11/98	EPA 6010B	0.250	1.52	"	
Chromium	0980288	"	9/15/98	EPA 6020	0.0100	ND	"	
Cobalt	"	"	"	EPA 6020	0.0100	ND	"	
Copper	"	"	"	EPA 6020	0.0300	ND	"	
Iron	0980291	"	9/11/98	EPA 6010B	0.150	3.96	"	
Lead	0980288	"	9/15/98	EPA 6020	1.00	1.35	"	
Magnesium	0980291	"	9/11/98	EPA 6010B	0.500	ND	"	
Manganese	0980288	"	9/15/98	EPA 6020	0.00500	0.0445	"	
Nickel	"	"	"	EPA 6020	0.0300	ND	"	
Potassium	0980291	"	9/11/98	EPA 6010B	0.200	0.657	"	
Selenium	0980288	"	9/15/98	EPA 6020	0.150	ND	"	
Silver	"	"	"	EPA 6020	0.0500	ND	"	
Sodium	0980291	"	9/11/98	EPA 6010B	0.500	22.3	"	
Thallium	0980288	"	9/15/98	EPA 6020	0.200	ND	"	
Vanadium	"	"	"	EPA 6020	0.200	ND	"	
Zinc	"	"	"	EPA 6020	0.0500	ND	"	
Mercury	0980053	9/2/98	9/3/98	EPA 7470A	0.00100	ND	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SB1-SS-01				B808411-01			Soil	2
Aldrin	0880705	8/25/98	9/22/98		1.00	ND	ug/kg dry	
alpha-BHC	"	"	"		0.500	ND	"	
beta-BHC	"	"	"		0.900	ND	"	
delta-BHC	"	"	"		0.600	ND	"	
gamma-BHC (Lindane)	"	"	"		1.00	ND	"	
Chlordane (tech)	"	"	"		1.00	ND	"	
alpha-Chlordane	"	"	"		0.800	ND	"	
gamma-Chlordane	"	"	"		0.700	ND	"	
4,4'-DDD	"	"	"		1.00	ND	"	
4,4'-DDE	"	"	"		1.00	ND	"	
4,4'-DDT	"	"	"		1.00	ND	"	
Dieldrin	"	"	"		2.00	ND	"	
Endosulfan I	"	"	"		1.00	ND	"	
Endosulfan II	"	"	"		2.00	ND	"	
Endosulfan sulfate	"	"	"		1.00	ND	"	
Endrin	"	"	"		2.00	ND	"	
Endrin aldehyde	"	"	"		2.00	ND	"	
Heptachlor	"	"	"		1.00	ND	"	
Heptachlor epoxide	"	"	"		1.00	ND	"	
Methoxychlor	"	"	"		4.00	ND	"	
Toxaphene	"	"	"		50.0	ND	"	
Aroclor 1016	"	"	"		50.0	ND	"	
Aroclor 1221	"	"	"		50.0	ND	"	
Aroclor 1232	"	"	"		50.0	ND	"	
Aroclor 1242	"	"	"		50.0	ND	"	
Aroclor 1248	"	"	"		50.0	ND	"	
Aroclor 1254	"	"	"		50.0	ND	"	
Aroclor 1260	"	"	"		50.0	ND	"	
Aroclor 1262	"	"	"		50.0	ND	"	
Aroclor 1268	"	"	"		50.0	ND	"	
Surrogate: TCX	"	"	"	40.0-130		85.5	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 18 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PW1-SS-01				B808411-05			Soil	2
Aldrin	0880705	8/25/98	9/22/98		1.00	ND	ug/kg dry	
alpha-BHC	"	"	"		0.500	ND	"	
beta-BHC	"	"	"		0.900	ND	"	
delta-BHC	"	"	"		0.600	ND	"	
gamma-BHC (Lindane)	"	"	"		1.00	ND	"	
Chlordane (tech)	"	"	"		1.00	ND	"	
alpha-Chlordane	"	"	"		0.800	ND	"	
gamma-Chlordane	"	"	"		0.700	ND	"	
4,4'-DDD	"	"	"		1.00	2.29	"	
4,4'-DDE	"	"	"		1.00	3.25	"	
4,4'-DDT	"	"	9/23/98		1.00	7.99	"	
Dieldrin	"	"	9/22/98		2.00	ND	"	
Endosulfan I	"	"	"		1.00	ND	"	
Endosulfan II	"	"	"		2.00	ND	"	
Endosulfan sulfate	"	"	"		1.00	ND	"	
Endrin	"	"	"		2.00	ND	"	
Endrin aldehyde	"	"	"		2.00	ND	"	
Heptachlor	"	"	"		1.00	ND	"	
Heptachlor epoxide	"	"	"		1.00	ND	"	
Methoxychlor	"	"	"		4.00	ND	"	
Toxaphene	"	"	"		50.0	ND	"	
Aroclor 1016	"	"	"		50.0	ND	"	
Aroclor 1221	"	"	"		50.0	ND	"	
Aroclor 1232	"	"	"		50.0	ND	"	
Aroclor 1242	"	"	"		50.0	ND	"	
Aroclor 1248	"	"	"		50.0	ND	"	
Aroclor 1254	"	"	"		50.0	ND	"	
Aroclor 1260	"	"	"		50.0	ND	"	
Aroclor 1262	"	"	"		50.0	ND	"	
Aroclor 1268	"	"	"		50.0	ND	"	
Surrogate: TCX	"	"	"	40.0-130		88.5	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 19 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TPI-SS-01				B808411-06			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		21.0	ND	ug/kg dry	
alpha-BHC	"	"	"		10.5	ND	"	
beta-BHC	"	"	"		18.9	ND	"	
delta-BHC	"	"	"		12.6	ND	"	
gamma-BHC (Lindane)	"	"	"		21.0	ND	"	
Chlordane (tech)	"	"	"		21.0	ND	"	
alpha-Chlordane	"	"	"		16.8	ND	"	
gamma-Chlordane	"	"	"		14.7	ND	"	
4,4'-DDD	"	"	9/23/98		101	3060	"	
4,4'-DDE	"	"	"		101	1830	"	
4,4'-DDT	"	"	"		101	9520	"	
Dieldrin	"	"	9/22/98		42.0	ND	"	
Endosulfan I	"	"	"		21.0	ND	"	
Endosulfan II	"	"	"		42.0	ND	"	
Endosulfan sulfate	"	"	"		21.0	ND	"	
Endrin	"	"	"		42.0	ND	"	
Endrin aldehyde	"	"	"		42.0	ND	"	
Heptachlor	"	"	"		21.0	ND	"	
Heptachlor epoxide	"	"	"		21.0	ND	"	
Methoxychlor	"	"	"		84.0	ND	"	
Toxaphene	"	"	"		1050	ND	"	
Aroclor 1016	"	"	"		1050	ND	"	
Aroclor 1221	"	"	"		1050	ND	"	
Aroclor 1232	"	"	"		1050	ND	"	
Aroclor 1242	"	"	"		1050	ND	"	
Aroclor 1248	"	"	"		1050	ND	"	
Aroclor 1254	"	"	"		1050	ND	"	
Aroclor 1260	"	"	"		1050	2250	"	
Aroclor 1262	"	"	"		1050	ND	"	
Aroclor 1268	"	"	"		1050	ND	"	
Surrogate: TCX	"	"	"	40.0-130		78.7	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 20 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01				B808411-07			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		11.0	ND	ug/kg dry	
alpha-BHC	"	"	"		5.50	ND	"	
beta-BHC	"	"	"		9.90	ND	"	
delta-BHC	"	"	"		6.60	ND	"	
gamma-BHC (Lindane)	"	"	"		11.0	ND	"	
Chlordane (tech)	"	"	"		11.0	ND	"	
alpha-Chlordane	"	"	"		8.80	ND	"	
gamma-Chlordane	"	"	"		7.70	ND	"	
4,4'-DDD	"	"	"		11.0	ND	"	
4,4'-DDE	"	"	"		11.0	ND	"	
4,4'-DDT	"	"	"		11.0	ND	"	
Dieldrin	"	"	"		22.0	ND	"	
Endosulfan I	"	"	"		11.0	ND	"	
Endosulfan II	"	"	"		22.0	ND	"	
Endosulfan sulfate	"	"	"		11.0	ND	"	
Endrin	"	"	"		22.0	ND	"	
Endrin aldehyde	"	"	"		22.0	ND	"	
Heptachlor	"	"	"		11.0	ND	"	
Heptachlor epoxide	"	"	"		11.0	ND	"	
Methoxychlor	"	"	"		44.0	ND	"	
Toxaphene	"	"	"		550	ND	"	
Aroclor 1016	"	"	"		550	ND	"	
Aroclor 1221	"	"	"		550	ND	"	
Aroclor 1232	"	"	"		550	ND	"	
Aroclor 1242	"	"	"		550	ND	"	
Aroclor 1248	"	"	"		550	ND	"	
Aroclor 1254	"	"	"		550	ND	"	
Aroclor 1260	"	"	"		550	ND	"	
Aroclor 1262	"	"	"		550	ND	"	
Aroclor 1268	"	"	"		550	ND	"	
Surrogate TCN	"	"	"	40.0-130		56.2	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01				B808411-08			Soil	2
Aldrin	0880705	8/25/98	9/22/98		1.00	ND	ug/kg dry	
alpha-BHC	"	"	"		0.500	ND	"	
beta-BHC	"	"	"		0.900	ND	"	
delta-BHC	"	"	"		0.600	ND	"	
gamma-BHC (Lindane)	"	"	"		1.00	ND	"	
Chlordane (tech)	"	"	"		1.00	ND	"	
alpha-Chlordane	"	"	"		0.800	ND	"	
gamma-Chlordane	"	"	"		0.700	ND	"	
4,4'-DDD	"	"	"		1.00	ND	"	
4,4'-DDE	"	"	"		1.00	ND	"	
4,4'-DDT	"	"	"		1.00	ND	"	
Dieldrin	"	"	"		2.00	ND	"	
Endosulfan I	"	"	"		1.00	ND	"	
Endosulfan II	"	"	"		2.00	ND	"	
Endosulfan sulfate	"	"	"		1.00	ND	"	
Endrin	"	"	"		2.00	ND	"	
Endrin aldehyde	"	"	"		2.00	ND	"	
Heptachlor	"	"	"		1.00	ND	"	
Heptachlor epoxide	"	"	"		1.00	ND	"	
Methoxychlor	"	"	"		4.00	ND	"	
Toxaphene	"	"	"		50.0	ND	"	
Aroclor 1016	"	"	"		50.0	ND	"	
Aroclor 1221	"	"	"		50.0	ND	"	
Aroclor 1232	"	"	"		50.0	ND	"	
Aroclor 1242	"	"	"		50.0	ND	"	
Aroclor 1248	"	"	"		50.0	ND	"	
Aroclor 1254	"	"	"		50.0	ND	"	
Aroclor 1260	"	"	"		50.0	ND	"	
Aroclor 1262	"	"	"		50.0	ND	"	
Aroclor 1268	"	"	"		50.0	ND	"	
Surrogate TCX	"	"	"	40.0-130		132	%	4

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S W Nimbus Avenue, Beaverton, OR 97008-7132

Page 22 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-01				B808411-09			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		21.0	ND	ug/kg dry	
alpha-BHC	"	"	"		10.5	ND	"	
beta-BHC	"	"	"		18.9	ND	"	
delta-BHC	"	"	"		12.6	ND	"	
gamma-BHC (Lindane)	"	"	"		21.0	ND	"	
Chlordane (tech)	"	"	"		21.0	ND	"	
alpha-Chlordane	"	"	"		16.8	ND	"	
gamma-Chlordane	"	"	"		14.7	ND	"	
4,4'-DDD	"	"	"		21.0	ND	"	
4,4'-DDE	"	"	"		21.0	ND	"	
4,4'-DDT	"	"	"		21.0	ND	"	
Dieldrin	"	"	"		42.0	ND	"	
Endosulfan I	"	"	"		21.0	ND	"	
Endosulfan II	"	"	"		42.0	ND	"	
Endosulfan sulfate	"	"	"		21.0	ND	"	
Endrin	"	"	"		42.0	ND	"	
Endrin aldehyde	"	"	"		42.0	ND	"	
Heptachlor	"	"	"		21.0	ND	"	
Heptachlor epoxide	"	"	"		21.0	ND	"	
Methoxychlor	"	"	"		84.0	ND	"	
Toxaphene	"	"	"		1050	ND	"	
Aroclor 1016	"	"	"		1050	ND	"	
Aroclor 1221	"	"	"		1050	ND	"	
Aroclor 1232	"	"	"		1050	ND	"	
Aroclor 1242	"	"	"		1050	ND	"	
Aroclor 1248	"	"	"		1050	ND	"	
Aroclor 1254	"	"	"		1050	ND	"	
Aroclor 1260	"	"	"		1050	ND	"	
Aroclor 1262	"	"	"		1050	ND	"	
Aroclor 1268	"	"	"		1050	ND	"	
Surrogate TCA	"	"	"	40.0-130		NR	%	5



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02				B808411-10			Soil	2
Aldrin	0880705	8/25/98	9/22/98		1.00	ND	ug/kg dry	
alpha-BHC	"	"	"		0.500	ND	"	
beta-BHC	"	"	"		0.900	ND	"	
delta-BHC	"	"	"		0.600	ND	"	
gamma-BHC (Lindane)	"	"	"		1.00	ND	"	
Chlordane (tech)	"	"	"		1.00	ND	"	
alpha-Chlordane	"	"	"		0.800	ND	"	
gamma-Chlordane	"	"	"		0.700	ND	"	
4,4'-DDD	"	"	"		1.00	ND	"	
4,4'-DDE	"	"	"		1.00	ND	"	
4,4'-DDT	"	"	"		1.00	ND	"	
Dieldrin	"	"	"		2.00	ND	"	
Endosulfan I	"	"	"		1.00	ND	"	
Endosulfan II	"	"	"		2.00	ND	"	
Endosulfan sulfate	"	"	"		1.00	ND	"	
Endrin	"	"	"		2.00	ND	"	
Endrin aldehyde	"	"	"		2.00	ND	"	
Heptachlor	"	"	"		1.00	ND	"	
Heptachlor epoxide	"	"	"		1.00	ND	"	
Methoxychlor	"	"	"		4.00	ND	"	
Toxaphene	"	"	"		50.0	ND	"	
Aroclor 1016	"	"	"		50.0	ND	"	
Aroclor 1221	"	"	"		50.0	ND	"	
Aroclor 1232	"	"	"		50.0	ND	"	
Aroclor 1242	"	"	"		50.0	ND	"	
Aroclor 1248	"	"	"		50.0	ND	"	
Aroclor 1254	"	"	"		50.0	ND	"	
Aroclor 1260	"	"	"		50.0	ND	"	
Aroclor 1262	"	"	"		50.0	ND	"	
Aroclor 1268	"	"	"		50.0	ND	"	
Surrogate: TCA	"	"	"	40.0-130		70.8	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 24 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01				B808411-11			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		21.0	ND	ug/kg dry	
alpha-BHC	"	"	"		10.5	ND	"	
beta-BHC	"	"	"		18.9	ND	"	
delta-BHC	"	"	"		12.6	ND	"	
gamma-BHC (Lindane)	"	"	"		21.0	ND	"	
Chlordane (tech)	"	"	"		21.0	ND	"	
alpha-Chlordane	"	"	"		16.8	ND	"	
gamma-Chlordane	"	"	"		14.7	ND	"	
4,4'-DDD	"	"	"		21.0	ND	"	
4,4'-DDE	"	"	"		21.0	ND	"	
4,4'-DDT	"	"	"		21.0	ND	"	
Dieldrin	"	"	"		42.0	ND	"	
Endosulfan I	"	"	"		21.0	ND	"	
Endosulfan II	"	"	"		42.0	ND	"	
Endosulfan sulfate	"	"	"		21.0	ND	"	
Endrin	"	"	"		42.0	ND	"	
Endrin aldehyde	"	"	"		42.0	ND	"	
Heptachlor	"	"	"		21.0	ND	"	
Heptachlor epoxide	"	"	"		21.0	ND	"	
Methoxychlor	"	"	"		84.0	ND	"	
Toxaphene	"	"	"		1050	ND	"	
Aroclor 1016	"	"	"		1050	ND	"	
Aroclor 1221	"	"	"		1050	ND	"	
Aroclor 1232	"	"	"		1050	ND	"	
Aroclor 1242	"	"	"		1050	ND	"	
Aroclor 1248	"	"	"		1050	ND	"	
Aroclor 1254	"	"	"		1050	ND	"	
Aroclor 1260	"	"	"		1050	ND	"	
Aroclor 1262	"	"	"		1050	ND	"	
Aroclor 1268	"	"	"		1050	ND	"	
Surrogate: TCX	"	"	"	40.0-130		NR	%	5

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 25 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01				B808411-12			Soil	2
Aldrin	0880705	8/25/98	9/22/98		1.00	ND	ug/kg dry	
alpha-BHC	"	"	"		0.500	ND	"	
beta-BHC	"	"	"		0.900	ND	"	
delta-BHC	"	"	"		0.600	ND	"	
gamma-BHC (Lindane)	"	"	"		1.00	ND	"	
Chlordane (tech)	"	"	"		1.00	ND	"	
alpha-Chlordane	"	"	"		0.800	ND	"	
gamma-Chlordane	"	"	"		0.700	ND	"	
4,4'-DDD	"	"	"		1.00	ND	"	
4,4'-DDE	"	"	"		1.00	ND	"	
4,4'-DDT	"	"	"		1.00	ND	"	
Dieldrin	"	"	"		2.00	ND	"	
Endosulfan I	"	"	"		1.00	ND	"	
Endosulfan II	"	"	"		2.00	ND	"	
Endosulfan sulfate	"	"	"		1.00	ND	"	
Endrin	"	"	"		2.00	ND	"	
Endrin aldehyde	"	"	"		2.00	ND	"	
Heptachlor	"	"	"		1.00	ND	"	
Heptachlor epoxide	"	"	"		1.00	ND	"	
Methoxychlor	"	"	"		4.00	ND	"	
Toxaphene	"	"	"		50.0	ND	"	
Aroclor 1016	"	"	"		50.0	ND	"	
Aroclor 1221	"	"	"		50.0	ND	"	
Aroclor 1232	"	"	"		50.0	ND	"	
Aroclor 1242	"	"	"		50.0	ND	"	
Aroclor 1248	"	"	"		50.0	ND	"	
Aroclor 1254	"	"	"		50.0	ND	"	
Aroclor 1260	"	"	"		50.0	ND	"	
Aroclor 1262	"	"	"		50.0	ND	"	
Aroclor 1268	"	"	"		50.0	ND	"	
Surrogate: TCX	"	"	"	40.0-130		82.2	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 26 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01				B808411-13			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		51.0	ND	ug/kg dry	
alpha-BHC	"	"	"		25.5	ND	"	
beta-BHC	"	"	"		45.9	ND	"	
delta-BHC	"	"	"		30.6	ND	"	
gamma-BHC (Lindane)	"	"	"		51.0	ND	"	
Chlordane (tech)	"	"	"		51.0	ND	"	
alpha-Chlordane	"	"	"		40.8	ND	"	
gamma-Chlordane	"	"	"		35.7	ND	"	
4,4'-DDD	"	"	"		51.0	ND	"	
4,4'-DDE	"	"	"		51.0	ND	"	
4,4'-DDT	"	"	"		51.0	ND	"	
Dieldrin	"	"	"		102	ND	"	
Endosulfan I	"	"	"		51.0	ND	"	
Endosulfan II	"	"	"		102	ND	"	
Endosulfan sulfate	"	"	"		51.0	ND	"	
Endrin	"	"	"		102	ND	"	
Endrin aldehyde	"	"	"		102	ND	"	
Heptachlor	"	"	"		51.0	ND	"	
Heptachlor epoxide	"	"	"		51.0	85.1	"	
Methoxychlor	"	"	"		204	ND	"	
Toxaphene	"	"	"		2550	ND	"	
Aroclor 1016	"	"	"		2550	ND	"	
Aroclor 1221	"	"	"		2550	ND	"	
Aroclor 1232	"	"	"		2550	ND	"	
Aroclor 1242	"	"	"		2550	ND	"	
Aroclor 1248	"	"	"		2550	ND	"	
Aroclor 1254	"	"	"		2550	ND	"	
Aroclor 1260	"	"	"		2550	ND	"	
Aroclor 1262	"	"	"		2550	ND	"	
Aroclor 1268	"	"	"		2550	ND	"	
Surrogate: TCN	"	"	"	40.0-130		NR	%	5



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	2.3
Aldrin	0880705	8/25/98	9/22/98		21.0	ND	ug/kg dry	
alpha-BHC	"	"	"		10.5	ND	"	
beta-BHC	"	"	"		18.9	ND	"	
delta-BHC	"	"	"		12.6	ND	"	
gamma-BHC (Lindane)	"	"	"		21.0	ND	"	
Chlordane (tech)	"	"	"		21.0	ND	"	
alpha-Chlordane	"	"	"		16.8	ND	"	
gamma-Chlordane	"	"	"		14.7	ND	"	
4,4'-DDD	"	"	"		21.0	ND	"	
4,4'-DDE	"	"	"		21.0	ND	"	
4,4'-DDT	"	"	"		21.0	ND	"	
Dieldrin	"	"	"		42.0	ND	"	
Endosulfan I	"	"	"		21.0	ND	"	
Endosulfan II	"	"	"		42.0	ND	"	
Endosulfan sulfate	"	"	"		21.0	ND	"	
Endrin	"	"	"		42.0	ND	"	
Endrin aldehyde	"	"	"		42.0	ND	"	
Heptachlor	"	"	"		21.0	ND	"	
Heptachlor epoxide	"	"	"		21.0	ND	"	
Methoxychlor	"	"	"		84.0	ND	"	
Toxaphene	"	"	"		1050	ND	"	
Aroclor 1016	"	"	"		1050	ND	"	
Aroclor 1221	"	"	"		1050	ND	"	
Aroclor 1232	"	"	"		1050	ND	"	
Aroclor 1242	"	"	"		1050	ND	"	
Aroclor 1248	"	"	"		1050	ND	"	
Aroclor 1254	"	"	"		1050	ND	"	
Aroclor 1260	"	"	"		1050	ND	"	
Aroclor 1262	"	"	"		1050	ND	"	
Aroclor 1268	"	"	"		1050	ND	"	
Surrogate TCX	"	"	"	40.0-130		NR	%	5

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 28 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SBI-SS-01			B808411-01				Soil	
2,4-D	0880759	8/26/98	9/2/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	ND	"	3
MCPA	"	"	"		750	ND	"	
MCP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		81.3	%	
8-19-98-BIL-PWI-SS-01			B808411-05				Soil	
2,4-D	0880759	8/26/98	9/2/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	ND	"	3
MCPA	"	"	"		750	ND	"	
MCP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		74.1	%	
8-19-98-BIL-TP1-SS-01			B808411-06				Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	ND	"	3
MCPA	"	"	"		750	ND	"	
MCP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		56.2	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 29 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01				B808411-07			Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	ND	"	3
MCPA	"	"	"		750	ND	"	
MCPP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		75.5	%	
8-19-98-BIL-TP4-SS-01				B808411-08			Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	51.2	"	3
MCPA	"	"	"		750	ND	"	
MCPP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		54.2	%	
8-20-98-BIL-TP6-SS-01				B808411-09			Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		10.0	ND	"	
MCPA	"	"	"		750	ND	"	
MCPP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		79.0	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 30 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02				B808411-10		Soil		
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		45.0	ND	"	3
MCPA	"	"	"		750	ND	"	
MCPD	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		72.5	%	
8-20-98-BIL-TP5-SS-01				B808411-11		Soil		
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		10.0	ND	"	
MCPA	"	"	"		750	ND	"	
MCPD	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		85.4	%	
8-20-98-BIL-TP8-SS-01				B808411-12		Soil		
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		10.0	ND	"	
MCPA	"	"	"		750	ND	"	
MCPD	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		58.0	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 31 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01				B808411-13			Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		10.0	ND	"	
MCPA	"	"	"		750	ND	"	
MCPP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		71.1	%	
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	
2,4-D	0880759	8/26/98	9/3/98		5.00	ND	ug/kg dry	
2,4-DB	"	"	"		20.0	ND	"	
2,4,5-T	"	"	"		20.0	ND	"	
2,4,5-TP (Silvex)	"	"	"		20.0	ND	"	
Dalapon	"	"	"		80.0	ND	"	6
Dicamba	"	"	"		5.00	ND	"	
Dichlorprop	"	"	"		15.0	ND	"	
Dinoseb	"	"	"		10.0	ND	"	
MCPA	"	"	"		750	ND	"	
MCPP	"	"	"		750	ND	"	
Surrogate: 2,4-DCAA	"	"	"	31.0-136		83.1	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-B1L-SB1-SS-01				B808411-01			Soil	
Acetone	0880906	8/31/98	8/31/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 33 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SB1-SS-01 (continued)				B808411-01		Soil		
Ethylbenzene	0880906	8/31/98	8/31/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		82.1	%	
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		94.0	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		90.2	"	
Surrogate: 4-BFB	"	"	"	70.0-130		92.3	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PW1-SS-01				B808411-05			Soil	
Acetone	0880906	8/31/98	8/31/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 35 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PWI-SS-01 (continued)				B808411-05			Soil	
Ethylbenzene	0880906	8/31/98	8/31/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		78.2	%	
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		88.7	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		91.6	"	
Surrogate: 4-BFB	"	"	"	70.0-130		89.5	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 36 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP1-SS-01				B808411-06			Soil	
Acetone	0880906	8/31/98	8/31/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue NE, Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 37 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TPI-SS-01 (continued)				B808411-06			Soil	
Ethylbenzene	0880906	8/31/98	8/31/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		62.4	%	7
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		77.2	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		71.4	"	
Surrogate: 4-BFB	"	"	"	70.0-130		68.2	"	7

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 38 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01				B808411-07			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 39 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01 (continued)				B808411-07		Soil		
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		87.8	%	
Surrogate: 1,2-DCM-d4	"	"	"	70.0-130		93.9	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		91.3	"	
Surrogate: 4-BFB	"	"	"	70.0-130		92.6	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 40 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01				B808411-08			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 41 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01 (continued)				B808411-08			Soil	
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		87.1	%	
Surrogate: 1,2-DC4-d4	"	"	"	70.0-130		97.1	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		92.9	"	
Surrogate: 4-BFB	"	"	"	70.0-130		90.0	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-01				B808411-09			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 43 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9220

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-01 (continued)				B808411-09		Soil		
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	0.139	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		86.1	%	
Surrogate: 1,2-DCI-d4	"	"	"	70.0-130		98.2	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		91.4	"	
Surrogate: 4-BFB	"	"	"	70.0-130		90.7	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 44 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02				B808411-10			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
Eas: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 45 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02 (continued)				B808411-10		Soil		
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		77.1	%	
Surrogate: 1,2-DC4-d4	"	"	"	70.0-130		90.4	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		85.7	"	
Surrogate: 4-BFB	"	"	"	70.0-130		84.1	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 46 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01				B808411-11			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	0.422	"	
sec-Butylbenzene	"	"	"		0.100	0.142	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	0.112	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 47 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 8/17/98 to 8/20/98
600 University St., Suite 800	Project Number: 10022-03	Received: 8/21/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01 (continued)				B808411-11			Soil	
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	0.228	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	0.314	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	0.333	"	
n-Propylbenzene	"	"	"		0.100	0.172	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	1.36	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	1.46	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	0.570	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	0.631	"	
o-Xylene	"	"	"		0.100	0.269	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		75.7	%	
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		91.8	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		85.2	"	
Surrogate: 4-BFB	"	"	"	70.0-130		83.6	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 48 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01				B808411-12			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 49 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01 (continued)				B808411-12			Soil	
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	1.34	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		84.8	%	
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		95.7	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		92.6	"	
Surrogate: 4-BFB	"	"	"	70.0-130		90.9	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 50 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01			B808411-13				Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	ND	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 51 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01 (continued)				B808411-13			Soil	
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	2.12	"	
Toluene	"	"	"		0.100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	ND	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate: 2-Bromopropene	"	"	"	70.0-130		89.4	%	
Surrogate: 1,2-DCA-d4	"	"	"	70.0-130		96.8	"	
Surrogate: Toluene-d8	"	"	"	70.0-130		95.4	"	
Surrogate: 4-BFB	"	"	"	70.0-130		93.5	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101 Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 52 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	
Acetone	0880906	8/31/98	9/1/98		2.00	ND	mg/kg dry	
Benzene	"	"	"		0.100	ND	"	
Bromobenzene	"	"	"		0.100	ND	"	
Bromochloromethane	"	"	"		0.100	ND	"	
Bromodichloromethane	"	"	"		0.100	ND	"	
Bromoform	"	"	"		0.100	ND	"	
Bromomethane	"	"	"		0.100	ND	"	
2-Butanone	"	"	"		2.00	ND	"	
n-Butylbenzene	"	"	"		0.100	0.146	"	
sec-Butylbenzene	"	"	"		0.100	ND	"	
tert-Butylbenzene	"	"	"		0.100	ND	"	
Carbon disulfide	"	"	"		0.100	ND	"	
Carbon tetrachloride	"	"	"		0.100	ND	"	
Chlorobenzene	"	"	"		0.100	ND	"	
Chloroethane	"	"	"		0.100	ND	"	
Chloroform	"	"	"		0.100	ND	"	
Chloromethane	"	"	"		0.500	ND	"	
2-Chlorotoluene	"	"	"		0.100	ND	"	
4-Chlorotoluene	"	"	"		0.100	ND	"	
Dibromochloromethane	"	"	"		0.100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		1.00	ND	"	
1,2-Dibromoethane	"	"	"		0.100	ND	"	
Dibromomethane	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
Dichlorodifluoromethane	"	"	"		0.100	ND	"	
1,1-Dichloroethane	"	"	"		0.100	ND	"	
1,2-Dichloroethane	"	"	"		0.100	ND	"	
1,1-Dichloroethene	"	"	"		0.100	ND	"	
cis-1,2-Dichloroethene	"	"	"		0.100	ND	"	
trans-1,2-Dichloroethene	"	"	"		0.100	ND	"	
1,2-Dichloropropane	"	"	"		0.100	ND	"	
1,3-Dichloropropane	"	"	"		0.100	ND	"	
2,2-Dichloropropane	"	"	"		0.100	ND	"	
1,1-Dichloropropene	"	"	"		0.100	ND	"	
cis-1,3-Dichloropropene	"	"	"		0.100	ND	"	
trans-1,3-Dichloropropene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue NE, Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 53 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01 (continued)				B808411-14		Soil		
Ethylbenzene	0880906	8/31/98	9/1/98		0.100	ND	mg/kg dry	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
2-Hexanone	"	"	"		2.00	ND	"	
Isopropylbenzene	"	"	"		0.100	ND	"	
p-Isopropyltoluene	"	"	"		0.100	ND	"	
Methylene chloride	"	"	"		1.00	ND	"	
4-Methyl-2-pentanone	"	"	"		2.00	ND	"	
Naphthalene	"	"	"		0.100	0.135	"	
n-Propylbenzene	"	"	"		0.100	ND	"	
Styrene	"	"	"		0.100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		0.100	ND	"	
1,1,1,2,2-Tetrachloroethane	"	"	"		0.100	ND	"	
Tetrachloroethene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.100	1.12	"	
1,2,3-Trichlorobenzene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
1,1,1-Trichloroethane	"	"	"		0.100	ND	"	
1,1,2-Trichloroethane	"	"	"		0.100	ND	"	
Trichloroethene	"	"	"		0.100	ND	"	
Trichlorofluoromethane	"	"	"		0.100	ND	"	
1,2,3-Trichloropropane	"	"	"		0.100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		0.100	0.448	"	
1,3,5-Trimethylbenzene	"	"	"		0.100	0.189	"	
Vinyl chloride	"	"	"		0.100	ND	"	
m,p-Xylene	"	"	"		0.200	ND	"	
o-Xylene	"	"	"		0.100	ND	"	
Surrogate 2-Bromopropene	"	"	"	70.0-130		79.6	%	
Surrogate 1,2-DCA-d4	"	"	"	70.0-130		92.8	"	
Surrogate Toluene-d8	"	"	"	70.0-130		89.8	"	
Surrogate 4-BFB	"	"	"	70.0-130		87.2	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SB1-SS-01			B808411-01			Soil		
Acenaphthene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.100	ND	"	
Aniline	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzoic Acid	"	"	"		0.500	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzyl alcohol	"	"	"		0.100	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.100	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.100	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.100	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		0.500	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.100	ND	"	
Butyl benzyl phthalate	"	"	"		0.100	ND	"	
Carbazole	"	"	"		0.500	ND	"	
4-Chloroaniline	"	"	"		0.100	ND	"	
2-Chloronaphthalene	"	"	"		0.100	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.100	ND	"	
2-Chlorophenol	"	"	"		0.100	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenz (a,h) anthracene	"	"	"		0.100	ND	"	
Dibenzofuran	"	"	"		0.100	ND	"	
Di-n-butyl phthalate	"	"	"		0.500	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
3,3'-Dichlorobenzidine	"	"	"		5.00	ND	"	
2,4-Dichlorophenol	"	"	"		0.100	ND	"	
Diethyl phthalate	"	"	"		0.100	ND	"	
2,4-Dimethylphenol	"	"	"		0.100	ND	"	
Dimethyl phthalate	"	"	"		0.100	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		0.500	ND	"	
2,4-Dinitrophenol	"	"	"		0.500	ND	"	
2,4-Dinitrotoluene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 55 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-17-98-BIL-SB1-SS-01 (continued)				B808411-01			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		0.500	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Hexachlorobenzene	"	"	"		0.100	ND	"	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.100	ND	"	
Hexachloroethane	"	"	"		0.100	ND	"	
Indeno (1.2.3-cd) pyrene	"	"	"		0.100	ND	"	
Isophorone	"	"	"		0.100	ND	"	
2-Methylnaphthalene	"	"	"		0.100	ND	"	
2-Methylphenol	"	"	"		0.100	ND	"	
3 & 4-Methylphenol	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
2-Nitroaniline	"	"	"		0.500	ND	"	
3-Nitroaniline	"	"	"		0.500	ND	"	
4-Nitroaniline	"	"	"		0.500	ND	"	
Nitrobenzene	"	"	"		0.100	ND	"	
2-Nitrophenol	"	"	"		0.100	ND	"	
4-Nitrophenol	"	"	"		0.500	ND	"	
N-Nitrosodiphenylamine	"	"	"		0.200	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.100	ND	"	
Pentachlorophenol	"	"	"		0.500	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Phenol	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
2,4,5-Trichlorophenol	"	"	"		0.500	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.100	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		71.3	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		64.6	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		96.4	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		76.4	"	
Surrogate: 2-FBP	"	"	"	51.0-124		93.3	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		114	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 56 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PW1-SS-01				B808411-05			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.100	ND	"	
Aniline	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzoic Acid	"	"	"		0.500	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzyl alcohol	"	"	"		0.100	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.100	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.100	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.100	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		0.500	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.100	ND	"	
Butyl benzyl phthalate	"	"	"		0.100	ND	"	
Carbazole	"	"	"		0.500	ND	"	
4-Chloroaniline	"	"	"		0.100	ND	"	
2-Chloronaphthalene	"	"	"		0.100	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.100	ND	"	
2-Chlorophenol	"	"	"		0.100	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenz (a,h) anthracene	"	"	"		0.100	ND	"	
Dibenzofuran	"	"	"		0.100	ND	"	
Di-n-butyl phthalate	"	"	"		0.500	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
3,3'-Dichlorobenzidine	"	"	"		5.00	ND	"	
2,4-Dichlorophenol	"	"	"		0.100	ND	"	
Diethyl phthalate	"	"	"		0.100	ND	"	
2,4-Dimethylphenol	"	"	"		0.100	ND	"	
Dimethyl phthalate	"	"	"		0.100	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		0.500	ND	"	
2,4-Dinitrophenol	"	"	"		0.500	ND	"	
2,4-Dinitrotoluene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 57 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-PW1-SS-01 (continued)				B808411-05		Soil		
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		0.500	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Hexachlorobenzene	"	"	"		0.100	ND	"	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.100	ND	"	
Hexachloroethane	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Isophorone	"	"	"		0.100	ND	"	
2-Methylnaphthalene	"	"	"		0.100	ND	"	
2-Methylphenol	"	"	"		0.100	ND	"	
3 & 4-Methylphenol	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
2-Nitroaniline	"	"	"		0.500	ND	"	
3-Nitroaniline	"	"	"		0.500	ND	"	
4-Nitroaniline	"	"	"		0.500	ND	"	
Nitrobenzene	"	"	"		0.100	ND	"	
2-Nitrophenol	"	"	"		0.100	ND	"	
4-Nitrophenol	"	"	"		0.500	ND	"	
N-Nitrosodiphenylamine	"	"	"		0.200	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.100	ND	"	
Pentachlorophenol	"	"	"		0.500	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Phenol	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
2,4,5-Trichlorophenol	"	"	"		0.500	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.100	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		67.7	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		66.2	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		126	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		70.7	"	
Surrogate: 2-FBP	"	"	"	51.0-124		84.8	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		117	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 58 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TPI-SS-01				B808411-06			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.500	ND	"	
Aniline	"	"	"		0.500	ND	"	
Anthracene	"	"	"		0.500	ND	"	
Benzoic Acid	"	"	"		2.50	ND	"	
Benzo (a) anthracene	"	"	"		0.500	ND	"	
Benzo (b) fluoranthene	"	"	"		0.500	ND	"	
Benzo (k) fluoranthene	"	"	"		0.500	ND	"	
Benzo (ghi) perylene	"	"	"		0.500	ND	"	
Benzo (a) pyrene	"	"	"		0.500	ND	"	
Benzyl alcohol	"	"	"		0.500	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.500	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.500	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.500	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		2.50	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.500	ND	"	
Butyl benzyl phthalate	"	"	"		0.500	ND	"	
Carbazole	"	"	"		2.50	ND	"	
4-Chloroaniline	"	"	"		0.500	ND	"	
2-Chloronaphthalene	"	"	"		0.500	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.500	ND	"	
2-Chlorophenol	"	"	"		0.500	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.500	ND	"	
Chrysene	"	"	"		0.500	ND	"	
Dibenz (a,h) anthracene	"	"	"		0.500	ND	"	
Dibenzofuran	"	"	"		0.500	ND	"	
Di-n-butyl phthalate	"	"	"		2.50	ND	"	
1,3-Dichlorobenzene	"	"	"		0.500	ND	"	
1,4-Dichlorobenzene	"	"	"		0.500	ND	"	
1,2-Dichlorobenzene	"	"	"		0.500	ND	"	
3,3'-Dichlorobenzidine	"	"	"		25.0	ND	"	
2,4-Dichlorophenol	"	"	"		0.500	ND	"	
Diethyl phthalate	"	"	"		0.500	ND	"	
2,4-Dimethylphenol	"	"	"		0.500	ND	"	
Dimethyl phthalate	"	"	"		0.500	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		2.50	ND	"	
2,4-Dinitrophenol	"	"	"		2.50	ND	"	
2,4-Dinitrotoluene	"	"	"		0.500	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 59 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TPI-SS-01 (continued)				B808411-06			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		2.50	ND	"	
Fluoranthene	"	"	"		0.500	ND	"	
Fluorene	"	"	"		0.500	ND	"	
Hexachlorobenzene	"	"	"		0.500	ND	"	
Hexachlorobutadiene	"	"	"		0.500	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.500	ND	"	
Hexachloroethane	"	"	"		0.500	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.500	ND	"	
Isophorone	"	"	"		0.500	ND	"	
2-Methylnaphthalene	"	"	"		0.500	ND	"	
2-Methylphenol	"	"	"		0.500	ND	"	
3 & 4-Methylphenol	"	"	"		0.500	ND	"	
Naphthalene	"	"	"		0.500	ND	"	
2-Nitroaniline	"	"	"		2.50	ND	"	
3-Nitroaniline	"	"	"		2.50	ND	"	
4-Nitroaniline	"	"	"		2.50	ND	"	
Nitrobenzene	"	"	"		0.500	ND	"	
2-Nitrophenol	"	"	"		0.500	ND	"	
4-Nitrophenol	"	"	"		2.50	ND	"	
N-Nitrosodiphenylamine	"	"	"		1.00	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.500	ND	"	
Pentachlorophenol	"	"	"		2.50	ND	"	
Phenanthrene	"	"	"		0.500	ND	"	
Phenol	"	"	"		0.500	ND	"	
Pyrene	"	"	"		0.500	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.500	ND	"	
2,4,5-Trichlorophenol	"	"	"		2.50	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.500	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		62.9	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		68.3	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		137	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		71.0	"	
Surrogate: 2-FBP	"	"	"	51.0-124		93.4	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		93.1	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 60 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01			B808411-07				Soil	
Acenaphthene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.500	ND	"	
Aniline	"	"	"		0.500	ND	"	
Anthracene	"	"	"		0.500	ND	"	
Benzoic Acid	"	"	"		2.50	ND	"	
Benzo (a) anthracene	"	"	"		0.500	1.72	"	
Benzo (b) fluoranthene	"	"	"		0.500	2.88	"	
Benzo (k) fluoranthene	"	"	"		0.500	0.890	"	
Benzo (ghi) perylene	"	"	"		0.500	1.40	"	
Benzo (a) pyrene	"	"	"		0.500	2.05	"	
Benzyl alcohol	"	"	"		0.500	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.500	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.500	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.500	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		2.50	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.500	ND	"	
Butyl benzyl phthalate	"	"	"		0.500	ND	"	
Carbazole	"	"	"		2.50	ND	"	
4-Chloroaniline	"	"	"		0.500	ND	"	
2-Chloronaphthalene	"	"	"		0.500	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.500	ND	"	
2-Chlorophenol	"	"	"		0.500	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.500	ND	"	
Chrysene	"	"	"		0.500	1.79	"	
Dibenz (a,h) anthracene	"	"	"		0.500	ND	"	
Dibenzofuran	"	"	"		0.500	ND	"	
Di-n-butyl phthalate	"	"	"		2.50	ND	"	
1,3-Dichlorobenzene	"	"	"		0.500	ND	"	
1,4-Dichlorobenzene	"	"	"		0.500	ND	"	
1,2-Dichlorobenzene	"	"	"		0.500	ND	"	
3,3'-Dichlorobenzidine	"	"	"		25.0	ND	"	
2,4-Dichlorophenol	"	"	"		0.500	ND	"	
Diethyl phthalate	"	"	"		0.500	ND	"	
2,4-Dimethylphenol	"	"	"		0.500	ND	"	
Dimethyl phthalate	"	"	"		0.500	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		2.50	ND	"	
2,4-Dinitrophenol	"	"	"		2.50	ND	"	
2,4-Dinitrotoluene	"	"	"		0.500	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 61 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/25/98 13:58
--	---	---

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP2-SS-01 (continued)				B808411-07			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		2.50	ND	"	
Fluoranthene	"	"	"		0.500	2.48	"	
Fluorene	"	"	"		0.500	ND	"	
Hexachlorobenzene	"	"	"		0.500	ND	"	
Hexachlorobutadiene	"	"	"		0.500	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.500	ND	"	
Hexachloroethane	"	"	"		0.500	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.500	1.56	"	
Isophorone	"	"	"		0.500	ND	"	
2-Methylnaphthalene	"	"	"		0.500	ND	"	
2-Methylphenol	"	"	"		0.500	ND	"	
3 & 4-Methylphenol	"	"	"		0.500	ND	"	
Naphthalene	"	"	"		0.500	ND	"	
2-Nitroaniline	"	"	"		2.50	ND	"	
3-Nitroaniline	"	"	"		2.50	ND	"	
4-Nitroaniline	"	"	"		2.50	ND	"	
Nitrobenzene	"	"	"		0.500	ND	"	
2-Nitrophenol	"	"	"		0.500	ND	"	
4-Nitrophenol	"	"	"		2.50	ND	"	
N-Nitrosodiphenylamine	"	"	"		1.00	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.500	ND	"	
Pentachlorophenol	"	"	"		2.50	ND	"	
Phenanthrene	"	"	"		0.500	0.709	"	
Phenol	"	"	"		0.500	ND	"	
Pyrene	"	"	"		0.500	4.05	"	
1,2,4-Trichlorobenzene	"	"	"		0.500	ND	"	
2,4,5-Trichlorophenol	"	"	"		2.50	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.500	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		62.5	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		64.6	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		116	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		66.1	"	
Surrogate: 2-FBP	"	"	"	51.0-124		89.1	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		115	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 62 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01				B808411-08			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.100	ND	"	
Aniline	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzoic Acid	"	"	"		0.500	ND	"	
Benzo (a) anthracene	"	"	"		0.100	0.111	"	
Benzo (b) fluoranthene	"	"	"		0.100	0.132	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzyl alcohol	"	"	"		0.100	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.100	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.100	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.100	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		0.500	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.100	ND	"	
Butyl benzyl phthalate	"	"	"		0.100	ND	"	
Carbazole	"	"	"		0.500	ND	"	
4-Chloroaniline	"	"	"		0.100	ND	"	
2-Chloronaphthalene	"	"	"		0.100	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.100	ND	"	
2-Chlorophenol	"	"	"		0.100	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	0.130	"	
Dibenz (a,h) anthracene	"	"	"		0.100	ND	"	
Dibenzofuran	"	"	"		0.100	ND	"	
Di-n-butyl phthalate	"	"	"		0.500	ND	"	
1,3-Dichlorobenzene	"	"	"		0.100	ND	"	
1,4-Dichlorobenzene	"	"	"		0.100	ND	"	
1,2-Dichlorobenzene	"	"	"		0.100	ND	"	
3,3'-Dichlorobenzidine	"	"	"		5.00	ND	"	
2,4-Dichlorophenol	"	"	"		0.100	ND	"	
Diethyl phthalate	"	"	"		0.100	ND	"	
2,4-Dimethylphenol	"	"	"		0.100	ND	"	
Dimethyl phthalate	"	"	"		0.100	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		0.500	ND	"	
2,4-Dinitrophenol	"	"	"		0.500	ND	"	
2,4-Dinitrotoluene	"	"	"		0.100	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chapin, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 63 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/25/98 13:58
--	---	---

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-19-98-BIL-TP4-SS-01 (continued)				B808411-08			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.100	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		0.500	ND	"	
Fluoranthene	"	"	"		0.100	0.164	"	
Fluorene	"	"	"		0.100	ND	"	
Hexachlorobenzene	"	"	"		0.100	ND	"	
Hexachlorobutadiene	"	"	"		0.100	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.100	ND	"	
Hexachloroethane	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Isophorone	"	"	"		0.100	ND	"	
2-Methylnaphthalene	"	"	"		0.100	ND	"	
2-Methylphenol	"	"	"		0.100	ND	"	
3 & 4-Methylphenol	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
2-Nitroaniline	"	"	"		0.500	ND	"	
3-Nitroaniline	"	"	"		0.500	ND	"	
4-Nitroaniline	"	"	"		0.500	ND	"	
Nitrobenzene	"	"	"		0.100	ND	"	
2-Nitrophenol	"	"	"		0.100	ND	"	
4-Nitrophenol	"	"	"		0.500	ND	"	
N-Nitrosodiphenylamine	"	"	"		0.200	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.100	ND	"	
Pentachlorophenol	"	"	"		0.500	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Phenol	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	0.222	"	
1,2,4-Trichlorobenzene	"	"	"		0.100	ND	"	
2,4,5-Trichlorophenol	"	"	"		0.500	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.100	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		76.5	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		71.8	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		131	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		80.8	"	
Surrogate: 2-FBP	"	"	"	51.0-124		94.4	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		115	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 64 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-01				B808411-09			Soil	
Acenaphthene	0880681	8/25/98	9/5/98		5.00	ND	mg/kg dry	
Acenaphthylene	"	"	"		5.00	ND	"	
Aniline	"	"	"		5.00	ND	"	
Anthracene	"	"	"		5.00	ND	"	
Benzoic Acid	"	"	"		25.0	ND	"	
Benzo (a) anthracene	"	"	"		5.00	6.31	"	
Benzo (b) fluoranthene	"	"	"		5.00	7.61	"	
Benzo (k) fluoranthene	"	"	"		5.00	ND	"	
Benzo (ghi) perylene	"	"	"		5.00	5.79	"	
Benzo (a) pyrene	"	"	"		5.00	6.03	"	
Benzyl alcohol	"	"	"		5.00	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		5.00	ND	"	
Bis(2-chloroethyl)ether	"	"	"		5.00	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		5.00	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		25.0	ND	"	
4-Bromophenyl phenyl ether	"	"	"		5.00	ND	"	
Butyl benzyl phthalate	"	"	"		5.00	ND	"	
Carbazole	"	"	"		25.0	ND	"	
4-Chloroaniline	"	"	"		5.00	ND	"	
2-Chloronaphthalene	"	"	"		5.00	ND	"	
4-Chloro-3-methylphenol	"	"	"		5.00	ND	"	
2-Chlorophenol	"	"	"		5.00	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		5.00	ND	"	
Chrysene	"	"	"		5.00	6.54	"	
Dibenz (a,h) anthracene	"	"	"		5.00	ND	"	
Dibenzofuran	"	"	"		5.00	ND	"	
Di-n-butyl phthalate	"	"	"		25.0	ND	"	
1,3-Dichlorobenzene	"	"	"		5.00	ND	"	
1,4-Dichlorobenzene	"	"	"		5.00	ND	"	
1,2-Dichlorobenzene	"	"	"		5.00	ND	"	
3,3'-Dichlorobenzidine	"	"	"		250	ND	"	
2,4-Dichlorophenol	"	"	"		5.00	ND	"	
Diethyl phthalate	"	"	"		5.00	ND	"	
2,4-Dimethylphenol	"	"	"		5.00	ND	"	
Dimethyl phthalate	"	"	"		5.00	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		25.0	ND	"	
2,4-Dinitrophenol	"	"	"		25.0	ND	"	
2,4-Dinitrotoluene	"	"	"		5.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 65 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-01 (continued)				B808411-09		Soil		
2,6-Dinitrotoluene	0880681	8/25/98	9/5/98		5.00	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		25.0	ND	"	
Fluoranthene	"	"	"		5.00	10.5	"	
Fluorene	"	"	"		5.00	ND	"	
Hexachlorobenzene	"	"	"		5.00	ND	"	
Hexachlorobutadiene	"	"	"		5.00	ND	"	
Hexachlorocyclopentadiene	"	"	"		5.00	ND	"	
Hexachloroethane	"	"	"		5.00	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		5.00	5.19	"	
Isophorone	"	"	"		5.00	ND	"	
2-Methylnaphthalene	"	"	"		5.00	ND	"	
2-Methylphenol	"	"	"		5.00	ND	"	
3 & 4-Methylphenol	"	"	"		5.00	ND	"	
Naphthalene	"	"	"		5.00	ND	"	
2-Nitroaniline	"	"	"		25.0	ND	"	
3-Nitroaniline	"	"	"		25.0	ND	"	
4-Nitroaniline	"	"	"		25.0	ND	"	
Nitrobenzene	"	"	"		5.00	ND	"	
2-Nitrophenol	"	"	"		5.00	ND	"	
4-Nitrophenol	"	"	"		25.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		10.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		5.00	ND	"	
Pentachlorophenol	"	"	"		25.0	ND	"	
Phenanthrene	"	"	"		5.00	12.8	"	
Phenol	"	"	"		5.00	ND	"	
Pyrene	"	"	"		5.00	15.8	"	
1,2,4-Trichlorobenzene	"	"	"		5.00	ND	"	
2,4,5-Trichlorophenol	"	"	"		25.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		5.00	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		37.9	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		30.0	"	4
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		47.9	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		50.0	"	
Surrogate: 2-FBP	"	"	"	51.0-124		82.1	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		122	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

13939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 66 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/23/98 13:58
--	---	---

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02				B808411-10			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.500	ND	"	
Aniline	"	"	"		0.500	ND	"	
Anthracene	"	"	"		0.500	ND	"	
Benzoic Acid	"	"	"		2.50	ND	"	
Benzo (a) anthracene	"	"	"		0.500	ND	"	
Benzo (b) fluoranthene	"	"	"		0.500	ND	"	
Benzo (k) fluoranthene	"	"	"		0.500	ND	"	
Benzo (ghi) perylene	"	"	"		0.500	ND	"	
Benzo (a) pyrene	"	"	"		0.500	ND	"	
Benzyl alcohol	"	"	"		0.500	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		0.500	ND	"	
Bis(2-chloroethyl)ether	"	"	"		0.500	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		0.500	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		2.50	ND	"	
4-Bromophenyl phenyl ether	"	"	"		0.500	ND	"	
Butyl benzyl phthalate	"	"	"		0.500	ND	"	
Carbazole	"	"	"		2.50	ND	"	
4-Chloroaniline	"	"	"		0.500	ND	"	
2-Chloronaphthalene	"	"	"		0.500	ND	"	
4-Chloro-3-methylphenol	"	"	"		0.500	ND	"	
2-Chlorophenol	"	"	"		0.500	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		0.500	ND	"	
Chrysene	"	"	"		0.500	ND	"	
Dibenz (a,h) anthracene	"	"	"		0.500	ND	"	
Dibenzofuran	"	"	"		0.500	ND	"	
Di-n-butyl phthalate	"	"	"		2.50	ND	"	
1,3-Dichlorobenzene	"	"	"		0.500	ND	"	
1,4-Dichlorobenzene	"	"	"		0.500	ND	"	
1,2-Dichlorobenzene	"	"	"		0.500	ND	"	
3,3'-Dichlorobenzidine	"	"	"		25.0	ND	"	
2,4-Dichlorophenol	"	"	"		0.500	ND	"	
Diethyl phthalate	"	"	"		0.500	ND	"	
2,4-Dimethylphenol	"	"	"		0.500	ND	"	
Dimethyl phthalate	"	"	"		0.500	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		2.50	ND	"	
2,4-Dinitrophenol	"	"	"		2.50	ND	"	
2,4-Dinitrotoluene	"	"	"		0.500	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang / Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 67 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP6-SS-02 (continued)				B808411-10			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		0.500	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		2.50	ND	"	
Fluoranthene	"	"	"		0.500	ND	"	
Fluorene	"	"	"		0.500	ND	"	
Hexachlorobenzene	"	"	"		0.500	ND	"	
Hexachlorobutadiene	"	"	"		0.500	ND	"	
Hexachlorocyclopentadiene	"	"	"		0.500	ND	"	
Hexachloroethane	"	"	"		0.500	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.500	ND	"	
Isophorone	"	"	"		0.500	ND	"	
2-Methylnaphthalene	"	"	"		0.500	ND	"	
2-Methylphenol	"	"	"		0.500	ND	"	
3 & 4-Methylphenol	"	"	"		0.500	ND	"	
Naphthalene	"	"	"		0.500	ND	"	
2-Nitroaniline	"	"	"		2.50	ND	"	
3-Nitroaniline	"	"	"		2.50	ND	"	
4-Nitroaniline	"	"	"		2.50	ND	"	
Nitrobenzene	"	"	"		0.500	ND	"	
2-Nitrophenol	"	"	"		0.500	ND	"	
4-Nitrophenol	"	"	"		2.50	ND	"	
N-Nitrosodiphenylamine	"	"	"		1.00	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		0.500	ND	"	
Pentachlorophenol	"	"	"		2.50	ND	"	
Phenanthrene	"	"	"		0.500	ND	"	
Phenol	"	"	"		0.500	ND	"	
Pyrene	"	"	"		0.500	ND	"	
1,2,4-Trichlorobenzene	"	"	"		0.500	ND	"	
2,4,5-Trichlorophenol	"	"	"		2.50	ND	"	
2,4,6-Trichlorophenol	"	"	"		0.500	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		74.1	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		68.5	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		105	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		72.1	"	
Surrogate: 2-FBP	"	"	"	51.0-124		97.6	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		116	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 68 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01			B808411-11				Soil	
Acenaphthene	0880681	8/25/98	8/27/98		2.50	ND	mg/kg dry	
Acenaphthylene	"	"	"		2.50	ND	"	
Aniline	"	"	"		2.50	ND	"	
Anthracene	"	"	"		2.50	ND	"	8
Benzoic Acid	"	"	"		12.5	ND	"	
Benzo (a) anthracene	"	"	"		2.50	ND	"	8
Benzo (b) fluoranthene	"	"	"		2.50	ND	"	8
Benzo (k) fluoranthene	"	"	"		2.50	ND	"	8
Benzo (ghi) perylene	"	"	"		2.50	ND	"	8
Benzo (a) pyrene	"	"	"		2.50	ND	"	8
Benzyl alcohol	"	"	"		2.50	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		2.50	ND	"	
Bis(2-chloroethyl)ether	"	"	"		2.50	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		2.50	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		12.5	ND	"	8
4-Bromophenyl phenyl ether	"	"	"		2.50	ND	"	8
Butyl benzyl phthalate	"	"	"		2.50	ND	"	8
Carbazole	"	"	"		12.5	ND	"	8
4-Chloroaniline	"	"	"		2.50	ND	"	
2-Chloronaphthalene	"	"	"		2.50	ND	"	
4-Chloro-3-methylphenol	"	"	"		2.50	ND	"	
2-Chlorophenol	"	"	"		2.50	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		2.50	ND	"	
Chrysene	"	"	"		2.50	ND	"	8
Dibenz (a,h) anthracene	"	"	"		2.50	ND	"	8
Dibenzofuran	"	"	"		2.50	ND	"	
Di-n-butyl phthalate	"	"	"		12.5	ND	"	8
1,3-Dichlorobenzene	"	"	"		2.50	ND	"	
1,4-Dichlorobenzene	"	"	"		2.50	ND	"	
1,2-Dichlorobenzene	"	"	"		2.50	ND	"	
3,3'-Dichlorobenzidine	"	"	"		125	ND	"	8
2,4-Dichlorophenol	"	"	"		2.50	ND	"	
Diethyl phthalate	"	"	"		2.50	ND	"	
2,4-Dimethylphenol	"	"	"		2.50	ND	"	
Dimethyl phthalate	"	"	"		2.50	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		12.5	ND	"	8
2,4-Dinitrophenol	"	"	"		12.5	ND	"	
2,4-Dinitrotoluene	"	"	"		2.50	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 69 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP5-SS-01 (continued)				B808411-11		Soil		
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		2.50	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		12.5	ND	"	8
Fluoranthene	"	"	"		2.50	ND	"	8
Fluorene	"	"	"		2.50	ND	"	
Hexachlorobenzene	"	"	"		2.50	ND	"	8
Hexachlorobutadiene	"	"	"		2.50	ND	"	
Hexachlorocyclopentadiene	"	"	"		2.50	ND	"	
Hexachloroethane	"	"	"		2.50	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		2.50	ND	"	8
Isophorone	"	"	"		2.50	ND	"	
2-Methylnaphthalene	"	"	"		2.50	ND	"	
2-Methylphenol	"	"	"		2.50	ND	"	
3 & 4-Methylphenol	"	"	"		2.50	ND	"	
Naphthalene	"	"	"		2.50	ND	"	
2-Nitroaniline	"	"	"		12.5	ND	"	
3-Nitroaniline	"	"	"		12.5	ND	"	
4-Nitroaniline	"	"	"		12.5	ND	"	
Nitrobenzene	"	"	"		2.50	ND	"	
2-Nitrophenol	"	"	"		2.50	ND	"	
4-Nitrophenol	"	"	"		12.5	ND	"	
N-Nitrosodiphenylamine	"	"	"		5.00	ND	"	8
N-Nitrosodi-n-propylamine	"	"	"		2.50	ND	"	
Pentachlorophenol	"	"	"		12.5	ND	"	8
Phenanthrene	"	"	"		2.50	ND	"	8
Phenol	"	"	"		2.50	ND	"	
Pyrene	"	"	"		2.50	ND	"	8
1,2,4-Trichlorobenzene	"	"	"		2.50	ND	"	
2,4,5-Trichlorophenol	"	"	"		12.5	ND	"	
2,4,6-Trichlorophenol	"	"	"		2.50	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		61.0	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		74.0	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		55.1	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		70.9	"	
Surrogate: 2-FBP	"	"	"	51.0-124		101	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		94.9	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 70 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01				B808411-12			Soil	
Acenaphthene	0880681	8/25/98	9/5/98		2.50	ND	mg/kg dry	
Acenaphthylene	"	"	"		2.50	ND	"	
Aniline	"	"	"		2.50	ND	"	
Anthracene	"	"	"		2.50	ND	"	
Benzoic Acid	"	"	"		12.5	ND	"	
Benzo (a) anthracene	"	"	"		2.50	ND	"	
Benzo (b) fluoranthene	"	"	"		2.50	ND	"	
Benzo (k) fluoranthene	"	"	"		2.50	ND	"	
Benzo (ghi) perylene	"	"	"		2.50	ND	"	
Benzo (a) pyrene	"	"	"		2.50	ND	"	
Benzyl alcohol	"	"	"		2.50	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		2.50	ND	"	
Bis(2-chloroethyl)ether	"	"	"		2.50	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		2.50	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		12.5	ND	"	
4-Bromophenyl phenyl ether	"	"	"		2.50	ND	"	
Butyl benzyl phthalate	"	"	"		2.50	ND	"	
Carbazole	"	"	"		12.5	ND	"	
4-Chloroaniline	"	"	"		2.50	ND	"	
2-Chloronaphthalene	"	"	"		2.50	ND	"	
4-Chloro-3-methylphenol	"	"	"		2.50	ND	"	
2-Chlorophenol	"	"	"		2.50	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		2.50	ND	"	
Chrysene	"	"	"		2.50	ND	"	
Dibenz (a,h) anthracene	"	"	"		2.50	ND	"	
Dibenzofuran	"	"	"		2.50	ND	"	
Di-n-butyl phthalate	"	"	"		12.5	ND	"	
1,3-Dichlorobenzene	"	"	"		2.50	ND	"	
1,4-Dichlorobenzene	"	"	"		2.50	ND	"	
1,2-Dichlorobenzene	"	"	"		2.50	ND	"	
3,3'-Dichlorobenzidine	"	"	"		125	ND	"	
2,4-Dichlorophenol	"	"	"		2.50	ND	"	
Diethyl phthalate	"	"	"		2.50	ND	"	
2,4-Dimethylphenol	"	"	"		2.50	ND	"	
Dimethyl phthalate	"	"	"		2.50	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		12.5	ND	"	
2,4-Dinitrophenol	"	"	"		12.5	ND	"	
2,4-Dinitrotoluene	"	"	"		2.50	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101 Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 71 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/25/98 13:58
--	---	---

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP8-SS-01 (continued)				B808411-12			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	9/5/98		2.50	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		12.5	ND	"	
Fluoranthene	"	"	"		2.50	ND	"	
Fluorene	"	"	"		2.50	ND	"	
Hexachlorobenzene	"	"	"		2.50	ND	"	
Hexachlorobutadiene	"	"	"		2.50	ND	"	
Hexachlorocyclopentadiene	"	"	"		2.50	ND	"	
Hexachloroethane	"	"	"		2.50	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		2.50	ND	"	
Isophorone	"	"	"		2.50	ND	"	
2-Methylnaphthalene	"	"	"		2.50	ND	"	
2-Methylphenol	"	"	"		2.50	ND	"	
3 & 4-Methylphenol	"	"	"		2.50	ND	"	
Naphthalene	"	"	"		2.50	ND	"	
2-Nitroaniline	"	"	"		12.5	ND	"	
3-Nitroaniline	"	"	"		12.5	ND	"	
4-Nitroaniline	"	"	"		12.5	ND	"	
Nitrobenzene	"	"	"		2.50	ND	"	
2-Nitrophenol	"	"	"		2.50	ND	"	
4-Nitrophenol	"	"	"		12.5	ND	"	
N-Nitrosodiphenylamine	"	"	"		5.00	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		2.50	ND	"	
Pentachlorophenol	"	"	"		12.5	ND	"	
Phenanthrene	"	"	"		2.50	ND	"	
Phenol	"	"	"		2.50	ND	"	
Pyrene	"	"	"		2.50	ND	"	
1,2,4-Trichlorobenzene	"	"	"		2.50	ND	"	
2,4,5-Trichlorophenol	"	"	"		12.5	ND	"	
2,4,6-Trichlorophenol	"	"	"		2.50	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		66.0	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		52.9	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		57.1	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		57.1	"	
Surrogate: 2-FBP	"	"	"	51.0-124		80.1	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		104	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery Suite B, Spokane WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 72 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01				B808411-13			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		10.0	ND	mg/kg dry	
Acenaphthylene	"	"	"		10.0	ND	"	
Aniline	"	"	"		10.0	ND	"	
Anthracene	"	"	"		10.0	11.0	"	
Benzoic Acid	"	"	"		50.0	ND	"	
Benzo (a) anthracene	"	"	"		10.0	84.3	"	
Benzo (b) fluoranthene	"	"	"		10.0	134	"	
Benzo (k) fluoranthene	"	"	"		10.0	53.4	"	
Benzo (ghi) perylene	"	"	"		10.0	70.4	"	
Benzo (a) pyrene	"	"	"		10.0	103	"	
Benzyl alcohol	"	"	"		10.0	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		10.0	ND	"	
Bis(2-chloroethyl)ether	"	"	"		10.0	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		10.0	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		50.0	73.4	"	
4-Bromophenyl phenyl ether	"	"	"		10.0	ND	"	
Butyl benzyl phthalate	"	"	"		10.0	ND	"	
Carbazole	"	"	"		50.0	ND	"	
4-Chloroaniline	"	"	"		10.0	ND	"	
2-Chloronaphthalene	"	"	"		10.0	ND	"	
4-Chloro-3-methylphenol	"	"	"		10.0	ND	"	
2-Chlorophenol	"	"	"		10.0	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		10.0	ND	"	
Chrysene	"	"	"		10.0	89.8	"	
Dibenz (a,h) anthracene	"	"	"		10.0	19.3	"	
Dibenzofuran	"	"	"		10.0	ND	"	
Di-n-butyl phthalate	"	"	"		50.0	ND	"	
1,3-Dichlorobenzene	"	"	"		10.0	ND	"	
1,4-Dichlorobenzene	"	"	"		10.0	ND	"	
1,2-Dichlorobenzene	"	"	"		10.0	ND	"	
3,3'-Dichlorobenzidine	"	"	"		500	ND	"	
2,4-Dichlorophenol	"	"	"		10.0	ND	"	
Diethyl phthalate	"	"	"		10.0	ND	"	
2,4-Dimethylphenol	"	"	"		10.0	ND	"	
Dimethyl phthalate	"	"	"		10.0	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		50.0	ND	"	
2,4-Dinitrophenol	"	"	"		50.0	ND	"	
2,4-Dinitrotoluene	"	"	"		10.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S W Nimbus Avenue, Beaverton, OR 97008-7132

Page 73 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP7-SS-01 (continued)				B808411-13		Soil		
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		10.0	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		50.0	ND	"	
Fluoranthene	"	"	"		10.0	136	"	
Fluorene	"	"	"		10.0	ND	"	
Hexachlorobenzene	"	"	"		10.0	ND	"	
Hexachlorobutadiene	"	"	"		10.0	ND	"	
Hexachlorocyclopentadiene	"	"	"		10.0	ND	"	
Hexachloroethane	"	"	"		10.0	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		10.0	72.9	"	
Isophorone	"	"	"		10.0	ND	"	
2-Methylnaphthalene	"	"	"		10.0	ND	"	
2-Methylphenol	"	"	"		10.0	ND	"	
3 & 4-Methylphenol	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		10.0	ND	"	
2-Nitroaniline	"	"	"		50.0	ND	"	
3-Nitroaniline	"	"	"		50.0	ND	"	
4-Nitroaniline	"	"	"		50.0	ND	"	
Nitrobenzene	"	"	"		10.0	ND	"	
2-Nitrophenol	"	"	"		10.0	ND	"	
4-Nitrophenol	"	"	"		50.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		20.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		10.0	ND	"	
Pentachlorophenol	"	"	"		50.0	ND	"	
Phenanthrene	"	"	"		10.0	37.5	"	
Phenol	"	"	"		10.0	ND	"	
Pyrene	"	"	"		10.0	268	"	
1,2,4-Trichlorobenzene	"	"	"		10.0	ND	"	
2,4,5-Trichlorophenol	"	"	"		50.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		10.0	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		3.99	%	9
Surrogate: Phenol-d6	"	"	"	44.0-128		3.99	"	9
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		27.9	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		39.9	"	
Surrogate: 2-FBP	"	"	"	51.0-124		87.8	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		148	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 74 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01				B808411-14			Soil	
Acenaphthene	0880681	8/25/98	8/27/98		2.50	ND	mg/kg dry	
Acenaphthylene	"	"	"		2.50	ND	"	
Aniline	"	"	"		2.50	ND	"	
Anthracene	"	"	"		2.50	ND	"	
Benzoic Acid	"	"	"		12.5	ND	"	
Benzo (a) anthracene	"	"	"		2.50	ND	"	8
Benzo (b) fluoranthene	"	"	"		2.50	ND	"	8
Benzo (k) fluoranthene	"	"	"		2.50	ND	"	8
Benzo (ghi) perylene	"	"	"		2.50	ND	"	8
Benzo (a) pyrene	"	"	"		2.50	ND	"	8
Benzyl alcohol	"	"	"		2.50	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		2.50	ND	"	
Bis(2-chloroethyl)ether	"	"	"		2.50	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		2.50	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		12.5	ND	"	8
4-Bromophenyl phenyl ether	"	"	"		2.50	ND	"	
Butyl benzyl phthalate	"	"	"		2.50	ND	"	8
Carbazole	"	"	"		12.5	ND	"	
4-Chloroaniline	"	"	"		2.50	ND	"	
2-Chloronaphthalene	"	"	"		2.50	ND	"	
4-Chloro-3-methylphenol	"	"	"		2.50	ND	"	
2-Chlorophenol	"	"	"		2.50	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		2.50	ND	"	
Chrysene	"	"	"		2.50	ND	"	8
Dibenz (a,h) anthracene	"	"	"		2.50	ND	"	8
Dibenzofuran	"	"	"		2.50	ND	"	
Di-n-butyl phthalate	"	"	"		12.5	ND	"	
1,3-Dichlorobenzene	"	"	"		2.50	ND	"	
1,4-Dichlorobenzene	"	"	"		2.50	ND	"	
1,2-Dichlorobenzene	"	"	"		2.50	ND	"	
3,3'-Dichlorobenzidine	"	"	"		125	ND	"	8
2,4-Dichlorophenol	"	"	"		2.50	ND	"	
Diethyl phthalate	"	"	"		2.50	ND	"	
2,4-Dimethylphenol	"	"	"		2.50	ND	"	
Dimethyl phthalate	"	"	"		2.50	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		12.5	ND	"	
2,4-Dinitrophenol	"	"	"		12.5	ND	"	
2,4-Dinitrotoluene	"	"	"		2.50	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 75 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
8-20-98-BIL-TP9-SS-01 (continued)				B808411-14			Soil	
2,6-Dinitrotoluene	0880681	8/25/98	8/27/98		2.50	ND	mg/kg dry	
Di-n-octyl phthalate	"	"	"		12.5	ND	"	8
Fluoranthene	"	"	"		2.50	ND	"	
Fluorene	"	"	"		2.50	ND	"	
Hexachlorobenzene	"	"	"		2.50	ND	"	
Hexachlorobutadiene	"	"	"		2.50	ND	"	
Hexachlorocyclopentadiene	"	"	"		2.50	ND	"	
Hexachloroethane	"	"	"		2.50	ND	"	
Indeno (1.2.3-cd) pyrene	"	"	"		2.50	ND	"	8
Isophorone	"	"	"		2.50	ND	"	
2-Methylnaphthalene	"	"	"		2.50	ND	"	
2-Methylphenol	"	"	"		2.50	ND	"	
3 & 4-Methylphenol	"	"	"		2.50	ND	"	
Naphthalene	"	"	"		2.50	ND	"	
2-Nitroaniline	"	"	"		12.5	ND	"	
3-Nitroaniline	"	"	"		12.5	ND	"	
4-Nitroaniline	"	"	"		12.5	ND	"	
Nitrobenzene	"	"	"		2.50	ND	"	
2-Nitrophenol	"	"	"		2.50	ND	"	
4-Nitrophenol	"	"	"		12.5	ND	"	
N-Nitrosodiphenylamine	"	"	"		5.00	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		2.50	ND	"	
Pentachlorophenol	"	"	"		12.5	ND	"	
Phenanthrene	"	"	"		2.50	ND	"	
Phenol	"	"	"		2.50	ND	"	
Pyrene	"	"	"		2.50	ND	"	8
1.2.4-Trichlorobenzene	"	"	"		2.50	ND	"	
2.4.5-Trichlorophenol	"	"	"		12.5	ND	"	
2.4.6-Trichlorophenol	"	"	"		2.50	ND	"	
Surrogate: 2-FP	"	"	"	19.0-141		56.9	%	
Surrogate: Phenol-d6	"	"	"	44.0-128		61.0	"	
Surrogate: 2,4,6-TBP	"	"	"	10.0-137		75.4	"	
Surrogate: Nitrobenzene-d5	"	"	"	33.0-108		84.1	"	
Surrogate: 2-FBP	"	"	"	51.0-124		95.4	"	
Surrogate: p-Terphenyl-d14	"	"	"	48.0-149		103	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 76 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Dry Weight Determination North Creek Analytical - Bothell

Sample Name	Lab ID	Matrix	Result	Units
8-17-98-BIL-SBI-SS-01	B808411-01	Soil	85.3	%
8-18-98-BIL-BK1-SS-01	B808411-02	Soil	71.1	%
8-18-98-BIL-BK2-SS-01	B808411-03	Soil	82.4	%
8-18-98-BIL-BK3-SS-01	B808411-04	Soil	78.1	%
8-19-98-BIL-PW1-SS-01	B808411-05	Soil	84.1	%
8-19-98-BIL-TP1-SS-01	B808411-06	Soil	64.3	%
8-19-98-BIL-TP2-SS-01	B808411-07	Soil	86.9	%
8-19-98-BIL-TP4-SS-01	B808411-08	Soil	71.4	%
8-20-98-BIL-TP6-SS-01	B808411-09	Soil	71.4	%
8-20-98-BIL-TP6-SS-02	B808411-10	Soil	66.4	%
8-20-98-BIL-TP5-SS-01	B808411-11	Soil	65.6	%
8-20-98-BIL-TP8-SS-01	B808411-12	Soil	87.1	%
8-20-98-BIL-TP7-SS-01	B808411-13	Soil	92.7	%
8-20-98-BIL-TP9-SS-01	B808411-14	Soil	85.3	%

North Creek Analytical - Bothell

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 77 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-----------------------	-----------------	------------	-----------	-------	--------

Batch: 0880628

Date Prepared: 8/24/98

Extraction Method: HCID (WA)

Blank

0880628-BLK1

Gx Range Hydrocarbons	8/25/98		ND	mg/kg dry	20.0					
Kerosene Range Hydrocarbons	"		ND	"	50.0					
Diesel Range Hydrocarbons	"		ND	"	50.0					
Insulating Oil Range Hydrocarbons	"		ND	"	100					
Heavy Fuel Oil Range Hydrocarbons	"		ND	"	100					
Lube Oil Range Hydrocarbons	"		ND	"	100					
Surrogate: 2-FBP	"	DET	DET	"	50.0-150	95.6				



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up)/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0880788									
Blank									
Date Prepared: 8/27/98									
Extraction Method: EPA 3550B									
Diesel Range Hydrocarbons	8/28/98		ND	ND	mg/kg dry	10.0			
Lube Oil Range Hydrocarbons	"		ND	ND	"	25.0			
Surrogate: 2-FBP	"	11.0		5.91	"	50.0-150	53.7		
LCS									
0880788-BS1									
Diesel Range Hydrocarbons	8/28/98	66.7		55.6	mg/kg dry	60.0-140	83.4		
Surrogate: 2-FBP	"	11.0		11.0	"	50.0-150	100		
Duplicate									
0880788-DUP1 B808411-13									
Diesel Range Hydrocarbons	9/1/98		1900	1820	mg/kg dry		50.0	4.30	
Lube Oil Range Hydrocarbons	"		2790	2730	"		50.0	2.17	
Surrogate: 2-FBP	"	11.8		11.4	"	50.0-150	96.6		



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-----------------------	-----------------	------------	-----------	-------	--------

Batch: 0980038

Date Prepared: 9/1/98

Extraction Method: EPA 3050B

Blank

0980038-BLK1

Antimony	9/3/98			ND	mg/kg dry	0.500				
Arsenic	"			ND	"	0.500				
Barium	"			ND	"	5.00				
Beryllium	"			ND	"	0.500				
Cadmium	"			ND	"	0.500				
Chromium	"			ND	"	0.500				
Cobalt	"			ND	"	0.500				
Copper	"			ND	"	0.500				
Lead	"			ND	"	0.500				
Manganese	"			ND	"	0.500				
Nickel	"			ND	"	0.500				
Selenium	"			ND	"	0.500				
Silver	"			ND	"	0.500				
Thallium	"			ND	"	0.500				
Vanadium	"			ND	"	0.500				
Zinc	"			ND	"	5.00				

LCS

0980038-BS1

Antimony	9/3/98	25.0		22.5	mg/kg dry	80.0-120	90.0			
Arsenic	"	25.0		21.0	"	70.0-130	84.0			
Barium	"	25.0		23.8	"	80.0-120	95.2			
Beryllium	9/4/98	25.0		21.6	"	80.0-120	86.4			
Cadmium	9/3/98	25.0		20.4	"	70.0-130	81.6			
Chromium	"	25.0		22.8	"	80.0-120	91.2			
Cobalt	"	25.0		22.5	"	80.0-120	90.0			
Copper	"	25.0		23.5	"	80.0-120	94.0			
Lead	"	25.0		24.0	"	80.0-120	96.0			
Manganese	"	25.0		23.2	"	80.0-120	92.8			
Nickel	"	25.0		21.8	"	80.0-120	87.2			
Selenium	"	25.0		19.0	"	70.0-130	76.0			
Silver	"	25.0		21.8	"	80.0-120	87.2			
Thallium	"	25.0		24.6	"	80.0-120	98.4			
Vanadium	"	25.0		22.8	"	80.0-120	91.2			
Zinc	"	25.0		21.6	"	70.0-130	86.4			

Duplicate

0980038-DUP1

B808411-08

Antimony	9/3/98		ND	ND	mg/kg dry		20.0			
----------	--------	--	----	----	-----------	--	------	--	--	--

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101 Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 80 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>Duplicate (continued)</u>										
	<u>0980038-DUP1</u>		<u>B808411-08</u>							
Arsenic	9/3/98		2.18	3.98	mg/kg dry			20.0	58.4	10
Barium	"		84.6	117	"			20.0	32.1	11
Beryllium	"		ND	ND	"			20.0		
Cadmium	"		ND	1.18	"			20.0		10
Chromium	"		9.12	11.8	"			20.0	25.6	11
Cobalt	"		8.28	9.86	"			20.0	17.4	
Copper	"		28.5	39.7	"			20.0	32.8	11
Lead	"		189	239	"			20.0	23.4	12
Manganese	"		273	361	"			20.0	27.8	12
Nickel	"		14.0	15.7	"			20.0	11.4	
Selenium	"		ND	ND	"			20.0		
Silver	"		ND	ND	"			20.0		
Thallium	"		ND	ND	"			20.0		
Vanadium	"		34.3	43.2	"			20.0	23.0	11
Zinc	"		57.9	94.3	"			20.0	47.8	12
<u>Matrix Spike</u>										
	<u>0980038-MS1</u>		<u>B808411-08</u>							
Antimony	9/3/98	31.9	ND	5.35	mg/kg dry	70.0-130	16.8			13
Arsenic	"	31.9	2.18	28.8	"	70.0-130	83.4			
Barium	"	31.9	84.6	126	"	70.0-130	130			
Beryllium	"	31.9	ND	29.8	"	70.0-130	93.4			
Cadmium	"	31.9	ND	28.3	"	70.0-130	88.7			
Chromium	"	31.9	9.12	36.0	"	70.0-130	84.3			
Cobalt	"	31.9	8.28	35.5	"	70.0-130	85.3			
Copper	"	31.9	28.5	62.4	"	70.0-130	106			
Lead	"	31.9	189	197	"	70.0-130	25.1			13
Manganese	"	31.9	273	405	"	70.0-130	NR			14
Nickel	"	31.9	14.0	39.4	"	70.0-130	79.6			
Selenium	"	31.9	ND	22.6	"	70.0-130	70.8			
Silver	"	31.9	ND	28.3	"	70.0-130	88.7			
Thallium	"	31.9	ND	31.5	"	70.0-130	98.7			
Vanadium	"	31.9	34.3	66.9	"	70.0-130	102			
Zinc	"	31.9	57.9	100	"	70.0-130	132			13
<u>Matrix Spike</u>										
	<u>0980038-MS2</u>		<u>B808411-08</u>							
Antimony	9/4/98	604	ND	598	mg/kg dry	70.0-130	99.0			15
Lead	"	604	189	822	"	70.0-130	105			15
Manganese	"	604	273	954	"	70.0-130	113			15

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 81 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recover. Limits	Recover. %	RPD Limit	RPD %	Notes*
Matrix Spike (continued)										
Zinc	0980038-MS2 9/3/98	B808411-08 604	57.9	663	mg/kg dry	70.0-130	100			15
Batch: 0980054										
Blank										
Mercury	0980054-BLK1 9/3/98			ND	mg/kg dry	0.100				
LCS										
Mercury	0980054-BS1 9/3/98	1.00		2.26	mg/kg dry	80.0-120	NR			16
Matrix Spike										
Mercury	0980054-MS1 9/3/98	B808411-12 0.526	3.50	2.66	mg/kg dry	80.0-120	NR			14
Matrix Spike Dup										
Mercury	0980054-MSD1 9/3/98	B808411-12 0.546	3.50	2.92	mg/kg dry	80.0-120	NR	20.0		4
Batch: 0980293										
Blank										
Aluminum	0980293-BLK1 9/10/98			ND	mg/kg dry	10.0				
Calcium	"			ND	"	15.0				
Iron	"			10.6	"	8.00				
Magnesium	"			ND	"	10.0				
Potassium	9/11/98			17.8	"	10.0				
Sodium	9/17/98			ND	"	25.0				
LCS										
Aluminum	0980293-BS1 9/10/98	5720		4690	mg/kg dry	70.0-130	82.0			
Calcium	"	1280		1310	"	70.0-130	102			
Iron	"	9080		7390	"	70.0-130	81.4			
Magnesium	"	1210		1230	"	70.0-130	102			
Potassium	9/11/98	1500		1690	"	70.0-130	113			16
Sodium	9/17/98	1380		1830	"	70.0-130	133			16
Matrix Spike										
Aluminum	0980293-MS1 9/10/98	B808411-08 65.5	11200	12400	mg/kg dry	70.0-130	NR			14
Calcium	"	65.5	6610	6370	"	70.0-130	NR			14
Iron	"	65.5	21500	18400	"	70.0-130	NR			14
Magnesium	"	65.5	7070	7010	"	70.0-130	NR			14

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 82 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>Matrix Spike (continued)</u>										
	<u>0980293-MS1</u>	<u>B808411-08</u>								
Sodium	9/17/98	65.5	585	834	mg/kg dry	70.0-130	NR			14
<u>Matrix Spike Dup</u>										
	<u>0980293-MSD1</u>	<u>B808411-08</u>								
Aluminum	9/17/98	64.3	11200	12700	mg/kg dry	70.0-130	NR	20.0	NR	14
Calcium	"	64.3	6610	6850	"	70.0-130	NR	20.0	NR	14
Iron	"	64.3	21500	18000	"	70.0-130	NR	20.0	NR	14
Magnesium	"	64.3	7070	7260	"	70.0-130	NR	20.0	NR	14
Sodium	9/17/98	64.3	585	997	"	70.0-130	NR	20.0	51.1	14
<u>Batch: 0980564</u>										
<u>Blank</u>										
<u>Date Prepared: 9/9/98</u>										
<u>0980564-BLK1</u>										
Potassium	9/10/98			ND	mg/kg dry	10.0				
<u>LCS</u>										
Potassium	9/10/98	1500		1130	mg/kg dry	70.0-130	75.3			
<u>Matrix Spike</u>										
	<u>0980564-MS1</u>	<u>B808411-08</u>								
Potassium	9/10/98	615	723	1020	mg/kg dry	70.0-130	48.3			14
<u>Matrix Spike Dup</u>										
	<u>0980564-MSD1</u>	<u>B808411-08</u>								
Potassium	9/10/98	599	723	1300	mg/kg dry	70.0-130	96.3	20.0	66.4	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 8/17/98 to 8/20/98 Received: 8/21/98 Reported: 9/25/98 13:58
--	---	---

SPLP Metals by EPA 1311/6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-----------------------	-----------------	------------	-----------	-------	--------

Batch: 0980053

Date Prepared: 9/2/98

Extraction Method: EPA 7470A

Blank

0980053-BLK1

Mercury	9/3/98			ND	mg/l	0.00100				
---------	--------	--	--	----	------	---------	--	--	--	--

LCS

0980053-BS1

Mercury	9/3/98	0.00500		0.00494	mg/l	80.0-120	98.8			
---------	--------	---------	--	---------	------	----------	------	--	--	--

Matrix Spike

0980053-MS1 B808411-07

Mercury	9/3/98	0.0100	ND	0.0102	mg/l	80.0-120	102			
---------	--------	--------	----	--------	------	----------	-----	--	--	--

Matrix Spike Dup

0980053-MSD1 B808411-07

Mercury	9/3/98	0.0100	ND	0.00996	mg/l	80.0-120	99.6	20.0	2.38	
---------	--------	--------	----	---------	------	----------	------	------	------	--

Batch: 0980288

Date Prepared: 9/9/98

Extraction Method: EPA 3020A

Blank

0980288-BLK1

Antimony	9/17/98			ND	mg/l	0.100				
Arsenic	9/15/98			ND	"	0.200				
Barium	"			ND	"	1.00				
Beryllium	9/17/98			ND	"	0.00500				
Cadmium	9/15/98			ND	"	0.00500				
Chromium	"			ND	"	0.0100				
Cobalt	"			ND	"	0.0100				
Copper	"			ND	"	0.0300				
Lead	"			ND	"	0.200				
Manganese	"			ND	"	0.00500				
Nickel	"			ND	"	0.0300				
Selenium	"			ND	"	0.150				
Silver	"			ND	"	0.0500				
Thallium	"			ND	"	0.200				
Vanadium	"			ND	"	0.200				
Zinc	"			ND	"	0.0500				

LCS

0980288-BS1

Antimony	9/15/98	1.00		0.904	mg/l	80.0-120	90.4			
Arsenic	"	1.00		1.12	"	80.0-120	112			
Barium	9/17/98	5.00		ND	"	80.0-120	NR			13
Beryllium	9/18/98	1.00		0.926	"	80.0-120	92.6			
Cadmium	9/15/98	1.00		1.08	"	80.0-120	108			
Chromium	"	1.00		1.01	"	80.0-120	101			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 84 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>LCS (continued)</u>										
	<u>0980288-BS1</u>									
Cobalt	9/15/98	1.00		0.990	mg/l	80.0-120	99.0			
Copper	"	1.00		1.00	"	80.0-120	100			
Lead	"	1.00		1.02	"	80.0-120	102			
Manganese	"	1.00		1.00	"	80.0-120	100			
Nickel	"	1.00		1.03	"	80.0-120	103			
Selenium	"	1.00		1.19	"	80.0-120	119			
Silver	"	0.500		0.507	"	80.0-120	101			
Thallium	"	1.00		0.995	"	80.0-120	99.5			
Vanadium	"	1.00		1.00	"	80.0-120	100			
Zinc	"	1.00		1.16	"	80.0-120	116			
<u>Matrix Spike</u>										
	<u>0980288-MS1</u>									
	<u>B808411-13</u>									
Antimony	9/15/98	1.00	ND	0.892	mg/l	80.0-120	89.2			
Arsenic	"	1.00	ND	1.10	"	80.0-120	110			
Barium	"	5.00	ND	5.16	"	80.0-120	103			
Beryllium	9/18/98	1.00	ND	0.856	"	80.0-120	85.6			
Cadmium	9/15/98	1.00	ND	1.10	"	80.0-120	110			
Chromium	"	1.00	ND	0.990	"	80.0-120	99.0			
Cobalt	"	1.00	ND	0.985	"	80.0-120	98.5			
Copper	"	1.00	ND	1.02	"	80.0-120	102			
Lead	"	1.00	1.35	2.36	"	80.0-120	101			
Manganese	"	1.00	0.0445	1.03	"	80.0-120	98.5			
Nickel	"	1.00	ND	1.01	"	80.0-120	101			
Selenium	"	1.00	ND	1.17	"	80.0-120	117			
Silver	"	0.500	ND	0.515	"	80.0-120	103			
Thallium	"	1.00	ND	0.965	"	80.0-120	96.5			
Vanadium	"	1.00	ND	0.960	"	80.0-120	96.0			
Zinc	"	1.00	ND	1.20	"	80.0-120	120			
<u>Matrix Spike Dup</u>										
	<u>0980288-MSD1</u>									
	<u>B808411-13</u>									
Antimony	9/15/98	1.00	ND	0.914	mg/l	80.0-120	91.4	20.0	2.44	
Arsenic	"	1.00	ND	1.07	"	80.0-120	107	20.0	2.76	
Barium	"	5.00	ND	5.32	"	80.0-120	106	20.0	2.87	
Beryllium	9/18/98	1.00	ND	0.984	"	80.0-120	98.4	20.0	13.9	
Cadmium	9/15/98	1.00	ND	1.10	"	80.0-120	110	20.0	0	
Chromium	"	1.00	ND	1.00	"	80.0-120	100	20.0	1.01	
Cobalt	"	1.00	ND	1.02	"	80.0-120	102	20.0	3.49	
Copper	"	1.00	ND	1.02	"	80.0-120	102	20.0	0	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 85 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Matrix Spike Dup (continued)										
	0980288-MSD1		B808411-13							
Lead	9/15/98	1.00	1.35	2.35	mg/l	80.0-120	100	20.0	0.995	
Manganese	"	1.00	0.0445	1.01	"	80.0-120	96.5	20.0	2.05	
Nickel	"	1.00	ND	1.02	"	80.0-120	102	20.0	0.985	
Selenium	"	1.00	ND	1.15	"	80.0-120	115	20.0	1.72	
Silver	"	0.500	ND	0.505	"	80.0-120	101	20.0	1.96	
Thallium	"	1.00	ND	0.970	"	80.0-120	97.0	20.0	0.517	
Vanadium	"	1.00	ND	0.985	"	80.0-120	98.5	20.0	2.57	
Zinc	"	1.00	ND	1.15	"	80.0-120	115	20.0	4.26	

Batch: 0980291

Date Prepared: 9/9/98

Extraction Method: EPA 3010A TCLP

Blank

0980291-BLK1

Aluminum	9/10/98		ND	mg/l	0.500
Calcium	"		ND	"	0.250
Iron	"		ND	"	0.150
Magnesium	"		ND	"	0.500
Potassium	"		ND	"	0.200
Sodium	"		ND	"	0.500

LCS

0980291-BS1

Aluminum	9/10/98	1.00	1.00	mg/l	80.0-120	100
Calcium	"	1.00	0.991	"	80.0-120	99.1
Iron	"	1.00	1.03	"	80.0-120	103
Magnesium	"	1.00	0.983	"	80.0-120	98.3
Potassium	"	10.0	9.60	"	80.0-120	96.0
Sodium	"	1.00	1.03	"	80.0-120	103

Matrix Spike

0980291-MS1

B808411-13

Aluminum	9/11/98	1.00	2.06	3.16	mg/l	80.0-120	110
Calcium	"	1.00	1.52	2.58	"	80.0-120	106
Iron	"	1.00	3.96	5.11	"	80.0-120	115
Magnesium	"	1.00	ND	1.51	"	80.0-120	151
Potassium	"	10.0	0.657	10.8	"	80.0-120	101
Sodium	"	1.00	22.3	23.2	"	80.0-120	90.0

Matrix Spike Dup

0980291-MSD1

B808411-13

Aluminum	9/11/98	1.00	2.06	3.18	mg/l	80.0-120	112	20.0	1.80
Calcium	"	1.00	1.52	2.62	"	80.0-120	110	20.0	3.70
Iron	"	1.00	3.96	4.90	"	80.0-120	94.0	20.0	20.1

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue Beaverton, OR 97008-7132

Page 86 of 99



BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

SPLP Metals by EPA 1311/6000/7000 Series Methods/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>Matrix Spike Dup (continued)</u>	<u>0980291-MSD1</u>		<u>B808411-13</u>							
Magnesium	9/11/98	1.00	ND	1.50	mg/l	80.0-120	150	20.0	0.664	
Potassium	"	10.0	0.657	11.0	"	80.0-120	103	20.0	1.96	
Sodium	"	1.00	22.3	23.7	"	80.0-120	140	20.0	43.5	14

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101 Bothell, WA 98011-9508
East 11115 Montgomery, Suite B. Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-----------------------	---------------	----------	-----------	-------	--------

Batch: 0880705

Date Prepared: 8/25/98

Extraction Method: EPA 3550B

Blank

0880705-BLK1

2

Aldrin	9/22/98		ND	ug/kg dry	1.00					
alpha-BHC	"		ND	"	0.500					
beta-BHC	"		ND	"	0.900					
delta-BHC	"		ND	"	0.600					
gamma-BHC (Lindane)	"		ND	"	1.00					
Chlordane (tech)	"		ND	"	1.00					
alpha-Chlordane	"		ND	"	0.800					
gamma-Chlordane	"		ND	"	0.700					
4,4'-DDD	"		ND	"	1.00					
4,4'-DDE	"		ND	"	1.00					
4,4'-DDT	"		ND	"	1.00					
Dieldrin	"		ND	"	2.00					
Endosulfan I	"		ND	"	1.00					
Endosulfan II	"		ND	"	2.00					
Endosulfan sulfate	"		ND	"	1.00					
Endrin	"		ND	"	2.00					
Endrin aldehyde	"		ND	"	2.00					
Heptachlor	"		ND	"	1.00					
Heptachlor epoxide	"		ND	"	1.00					
Methoxychlor	"		ND	"	4.00					
Toxaphene	"		ND	"	50.0					
Aroclor 1016	"		ND	"	50.0					
Aroclor 1221	"		ND	"	50.0					
Aroclor 1232	"		ND	"	50.0					
Aroclor 1242	"		ND	"	50.0					
Aroclor 1248	"		ND	"	50.0					
Aroclor 1254	"		ND	"	50.0					
Aroclor 1260	"		ND	"	50.0					
Aroclor 1262	"		ND	"	50.0					
Aroclor 1268	"		ND	"	50.0					
Surrogate: TCX	"	6.6	5.75	"	40.0-130	86.2				

LCS

0880705-BS1

2

Aldrin	9/22/98	8.33	8.97	ug/kg dry	35.0-138	108				
gamma-BHC (Lindane)	"	8.33	9.32	"	44.0-137	112				
Heptachlor	"	8.33	9.74	"	40.0-146	117				
Aroclor 1260	"	333	246	"	28.0-132	73.9				

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 88 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)										
0880705-BS1										
Surrogate: TCX	9/22/98	6.67		5.93	ug/kg dry	40.0-130	88.9			
Matrix Spike										
0880705-MS1 B808411-07										
Aldrin	9/22/98	9.59	ND	7.24	ug/kg dry	35.0-138	75.5			2
gamma-BHC (Lindane)	"	9.59	ND	8.66	"	44.0-137	90.3			
Heptachlor	"	9.59	ND	9.28	"	40.0-146	96.8			
Aroclor 1260	"	383	ND	310	"	44.0-123	80.9			
Surrogate: TCX	"	7.67		5.81	"	40.0-130	75.7			
Matrix Spike Dup										
0880705-MSD1 B808411-07										
Aldrin	9/22/98	9.59	ND	7.32	ug/kg dry	35.0-138	76.3	33.0	1.05	2
gamma-BHC (Lindane)	"	9.59	ND	8.88	"	44.0-137	92.6	35.0	2.52	
Heptachlor	"	9.59	ND	10.1	"	40.0-146	105	32.0	8.13	
Aroclor 1260	"	383	ND	382	"	44.0-123	99.7	23.0	20.8	
Surrogate: TCX	"	7.67		5.89	"	40.0-130	76.8			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 89 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Chlorinated Herbicides by EPA Method 8151A/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0880759										
Blank										
Date Prepared: 8/26/98										
0880759-BLK1										
2,4-D	9/2/98			ND	ug/kg dry	5.00				
2,4-DB	"			ND	"	20.0				
2,4,5-T	"			ND	"	20.0				
2,4,5-TP (Silvex)	"			ND	"	20.0				
Dalapon	"			ND	"	80.0				6
Dicamba	"			ND	"	5.00				
Dichlorprop	"			ND	"	15.0				
Dinoseb	"			ND	"	45.0				3
MCPA	"			ND	"	750				
MCPP	"			ND	"	750				
Surrogate: 2,4-DCAA	"	333		258	"	31.0-136	77.5			
LCS										
0880759-BS1										
2,4-D	9/2/98	100		93.2	ug/kg dry	41.0-141	93.2			
2,4,5-TP (Silvex)	"	100		92.8	"	51.0-116	92.8			
Surrogate: 2,4-DCAA	"	333		299	"	31.0-136	89.8			
LCS Dup										
0880759-BSD1										
2,4-D	9/2/98	100		109	ug/kg dry	41.0-141	109	44.0	15.6	
2,4,5-TP (Silvex)	"	100		96.5	"	51.0-116	96.5	27.0	3.91	
Surrogate: 2,4-DCAA	"	333		291	"	31.0-136	87.4			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0880906		Date Prepared: 8/31/98		Extraction Method: EPA 5030B [MeOH]						
Blank		0880906-BLK1								
Acetone	8/31/98			ND	mg/kg dry	2.00				
Benzene	"			ND	"	0.100				
Bromobenzene	"			ND	"	0.100				
Bromochloromethane	"			ND	"	0.100				
Bromodichloromethane	"			ND	"	0.100				
Bromoform	"			ND	"	0.100				
Bromomethane	"			ND	"	0.100				
2-Butanone	"			ND	"	2.00				
n-Butylbenzene	"			ND	"	0.100				
sec-Butylbenzene	"			ND	"	0.100				
tert-Butylbenzene	"			ND	"	0.100				
Carbon disulfide	"			ND	"	0.100				
Carbon tetrachloride	"			ND	"	0.100				
Chlorobenzene	"			ND	"	0.100				
Chloroethane	"			ND	"	0.100				
Chloroform	"			ND	"	0.100				
Chloromethane	"			ND	"	0.500				
2-Chlorotoluene	"			ND	"	0.100				
4-Chlorotoluene	"			ND	"	0.100				
Dibromochloromethane	"			ND	"	0.100				
1,2-Dibromo-3-chloropropane	"			ND	"	1.00				
1,2-Dibromoethane	"			ND	"	0.100				
Dibromomethane	"			ND	"	0.100				
1,2-Dichlorobenzene	"			ND	"	0.100				
1,3-Dichlorobenzene	"			ND	"	0.100				
1,4-Dichlorobenzene	"			ND	"	0.100				
Dichlorodifluoromethane	"			ND	"	0.100				
1,1-Dichloroethane	"			ND	"	0.100				
1,2-Dichloroethane	"			ND	"	0.100				
1,1-Dichloroethene	"			ND	"	0.100				
cis-1,2-Dichloroethene	"			ND	"	0.100				
trans-1,2-Dichloroethene	"			ND	"	0.100				
1,2-Dichloropropane	"			ND	"	0.100				
1,3-Dichloropropane	"			ND	"	0.100				
2,2-Dichloropropane	"			ND	"	0.100				
1,1-Dichloropropene	"			ND	"	0.100				
cis-1,3-Dichloropropene	"			ND	"	0.100				

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 91 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
Blank (continued)		0880906-BLK1								
trans-1,3-Dichloropropene	8/31/98			ND	mg/kg dry	0.100				
Ethylbenzene	"			ND	"	0.100				
Hexachlorobutadiene	"			ND	"	0.100				
2-Hexanone	"			ND	"	2.00				
Isopropylbenzene	"			ND	"	0.100				
p-Isopropyltoluene	"			ND	"	0.100				
Methylene chloride	"			ND	"	1.00				
4-Methyl-2-pentanone	"			ND	"	2.00				
Naphthalene	"			ND	"	0.100				
n-Propylbenzene	"			ND	"	0.100				
Styrene	"			ND	"	0.100				
1,1,1,2-Tetrachloroethane	"			ND	"	0.100				
1,1,2,2-Tetrachloroethane	"			ND	"	0.100				
Tetrachloroethene	"			ND	"	0.100				
Toluene	"			ND	"	0.100				
1,2,3-Trichlorobenzene	"			ND	"	0.100				
1,2,4-Trichlorobenzene	"			ND	"	0.100				
1,1,1-Trichloroethane	"			ND	"	0.100				
1,1,2-Trichloroethane	"			ND	"	0.100				
Trichloroethene	"			ND	"	0.100				
Trichlorofluoromethane	"			ND	"	0.100				
1,2,3-Trichloropropane	"			ND	"	0.100				
1,2,4-Trimethylbenzene	"			ND	"	0.100				
1,3,5-Trimethylbenzene	"			ND	"	0.100				
Vinyl chloride	"			ND	"	0.100				
m,p-Xylene	"			ND	"	0.200				
o-Xylene	"			ND	"	0.100				
Surrogate: 2-Bromopropene	"	2.00		1.91	"	70.0-130	95.5			
Surrogate: 1,2-DCA-d4	"	2.00		1.99	"	70.0-130	99.5			
Surrogate: Toluene-d8	"	2.00		1.99	"	70.0-130	99.5			
Surrogate: 4-BFB	"	2.00		1.92	"	70.0-130	96.0			
LCS		0880906-BS1								
Benzene	8/31/98	1.00		0.933	mg/kg dry	70.0-130	93.3			
Chlorobenzene	"	1.00		0.951	"	70.0-130	95.1			
1,1-Dichloroethene	"	1.00		0.773	"	70.0-130	77.3			
Toluene	"	1.00		0.884	"	70.0-130	88.4			
Trichloroethene	"	1.00		0.933	"	70.0-130	93.3			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E. Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 92 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)										
		0880906-BS1								
Surrogate: 2-Bromopropene	8/31/98	2.00		1.90	mg/kg dry	70.0-130	95.0			
Surrogate: 1,2-DCA-d4	"	2.00		2.15	"	70.0-130	108			
Surrogate: Toluene-d8	"	2.00		2.00	"	70.0-130	100			
Surrogate: 4-BFB	"	2.00		1.99	"	70.0-130	99.5			
Matrix Spike										
		0880906-MS1 B808411-01								
Benzene	8/31/98	1.17	ND	0.994	mg/kg dry	70.0-130	85.0			
Chlorobenzene	"	1.17	ND	1.01	"	70.0-130	86.3			
1,1-Dichloroethene	"	1.17	ND	0.793	"	70.0-130	67.8			13
Toluene	"	1.17	ND	0.945	"	70.0-130	80.8			
Trichloroethene	"	1.17	ND	1.00	"	70.0-130	85.5			
Surrogate: 2-Bromopropene	"	2.34		1.90	"	70.0-130	81.2			
Surrogate: 1,2-DCA-d4	"	2.34		2.19	"	70.0-130	93.6			
Surrogate: Toluene-d8	"	2.34		2.06	"	70.0-130	88.0			
Surrogate: 4-BFB	"	2.34		2.09	"	70.0-130	89.3			
Matrix Spike Dup										
		0880906-MSD1 B808411-01								
Benzene	8/31/98	1.17	ND	1.03	mg/kg dry	70.0-130	88.0	15.0	3.47	
Chlorobenzene	"	1.17	ND	1.06	"	70.0-130	90.6	15.0	4.86	
1,1-Dichloroethene	"	1.17	ND	0.840	"	70.0-130	71.8	15.0	5.73	
Toluene	"	1.17	ND	0.983	"	70.0-130	84.0	15.0	3.88	
Trichloroethene	"	1.17	ND	1.04	"	70.0-130	88.9	15.0	3.90	
Surrogate: 2-Bromopropene	"	2.34		2.03	"	70.0-130	86.8			
Surrogate: 1,2-DCA-d4	"	2.34		2.30	"	70.0-130	98.3			
Surrogate: Toluene-d8	"	2.34		2.19	"	70.0-130	93.6			
Surrogate: 4-BFB	"	2.34		2.17	"	70.0-130	92.7			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0880681		Date Prepared: 8/25/98			Extraction Method: EPA 3550B					
Blank		0880681-BLK1								
Acenaphthene	8/26/98			ND	mg/kg dry	0.100				
Acenaphthylene	"			ND	"	0.100				
Aniline	"			ND	"	0.100				
Anthracene	"			ND	"	0.100				
Benzoic Acid	"			ND	"	0.500				
Benzo (a) anthracene	"			ND	"	0.100				
Benzo (b) fluoranthene	"			ND	"	0.100				
Benzo (k) fluoranthene	"			ND	"	0.100				
Benzo (ghi) perylene	"			ND	"	0.100				
Benzo (a) pyrene	"			ND	"	0.100				
Benzyl alcohol	"			ND	"	0.100				
Bis(2-chloroethoxy)methane	"			ND	"	0.100				
Bis(2-chloroethyl)ether	"			ND	"	0.100				
Bis(2-chloroisopropyl)ether	"			ND	"	0.100				
Bis(2-ethylhexyl)phthalate	"			ND	"	0.500				
4-Bromophenyl phenyl ether	"			ND	"	0.100				
Butyl benzyl phthalate	"			ND	"	0.100				
Carbazole	"			ND	"	0.500				
4-Chloroaniline	"			ND	"	0.100				
2-Chloronaphthalene	"			ND	"	0.100				
4-Chloro-3-methylphenol	"			ND	"	0.100				
2-Chlorophenol	"			ND	"	0.100				
4-Chlorophenyl phenyl ether	"			ND	"	0.100				
Chrysene	"			ND	"	0.100				
Dibenz (a,h) anthracene	"			ND	"	0.100				
Dibenzofuran	"			ND	"	0.100				
Di-n-butyl phthalate	"			ND	"	0.500				
1,3-Dichlorobenzene	"			ND	"	0.100				
1,4-Dichlorobenzene	"			ND	"	0.100				
1,2-Dichlorobenzene	"			ND	"	0.100				
3,3'-Dichlorobenzidine	"			ND	"	5.00				
2,4-Dichlorophenol	"			ND	"	0.100				
Diethyl phthalate	"			ND	"	0.100				
2,4-Dimethylphenol	"			ND	"	0.100				
Dimethyl phthalate	"			ND	"	0.100				
4,6-Dinitro-2-methylphenol	"			ND	"	0.500				
2,4-Dinitrophenol	"			ND	"	0.500				

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 94 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
Blank (continued)										
0880681-BLK1										
2,4-Dinitrotoluene	8/26/98			ND	mg/kg dry	0.100				
2,6-Dinitrotoluene	"			ND	"	0.100				
Di-n-octyl phthalate	"			ND	"	0.500				
Fluoranthene	"			ND	"	0.100				
Fluorene	"			ND	"	0.100				
Hexachlorobenzene	"			ND	"	0.100				
Hexachlorobutadiene	"			ND	"	0.100				
Hexachlorocyclopentadiene	"			ND	"	0.100				
Hexachloroethane	"			ND	"	0.100				
Indeno (1,2,3-cd) pyrene	"			ND	"	0.100				
Isophorone	"			ND	"	0.100				
2-Methylnaphthalene	"			ND	"	0.100				
2-Methylphenol	"			ND	"	0.100				
3-Methylphenol	"			ND	"	0.100				
4-Methylphenol	"			ND	"	0.100				
Naphthalene	"			ND	"	0.100				
2-Nitroaniline	"			ND	"	0.500				
3-Nitroaniline	"			ND	"	0.500				
4-Nitroaniline	"			ND	"	0.500				
Nitrobenzene	"			ND	"	0.100				
2-Nitrophenol	"			ND	"	0.100				
4-Nitrophenol	"			ND	"	0.500				
N-Nitrosodiphenylamine	"			ND	"	0.200				
N-Nitrosodi-n-propylamine	"			ND	"	0.100				
Pentachlorophenol	"			ND	"	0.500				
Phenanthrene	"			ND	"	0.100				
Phenol	"			ND	"	0.100				
Pyrene	"			ND	"	0.100				
1,2,4-Trichlorobenzene	"			ND	"	0.100				
2,4,5-Trichlorophenol	"			ND	"	0.500				
2,4,6-Trichlorophenol	"			ND	"	0.100				
Surrogate: 2-FP	"	1.67		1.18	"	19.0-141	70.7			
Surrogate: Phenol-d6	"	1.67		1.18	"	44.0-128	70.7			
Surrogate: 2,4,6-TBP	"	1.67		1.64	"	10.0-137	98.2			
Surrogate: Nitrobenzene-d5	"	1.67		1.33	"	33.0-108	79.6			
Surrogate: 2-FBP	"	1.67		1.58	"	51.0-124	94.6			
Surrogate: p-Terphenyl-d14	"	1.67		1.79	"	48.0-149	107			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recover. Limits	Recover. %	RPD Limit	RPD %	Notes*
LCS										
0880681-BS1										
Acenaphthene	8/26/98	3.33		2.22	mg/kg dry	48.0-110	66.7			
4-Chloro-3-methylphenol	"	6.67		5.00	"	34.0-115	75.0			
2-Chlorophenol	"	6.67		4.24	"	57.0-110	63.6			
1,4-Dichlorobenzene	"	3.33		2.30	"	39.0-110	69.1			
2,4-Dinitrotoluene	"	3.33		2.51	"	50.0-110	75.4			
4-Nitrophenol	"	6.67		4.37	"	26.0-116	65.5			
N-Nitrosodi-n-propylamine	"	3.33		2.22	"	28.0-147	66.7			
Pentachlorophenol	"	6.67		6.34	"	46.0-120	95.1			
Phenol	"	6.67		4.03	"	35.0-110	60.4			
Pyrene	"	3.33		2.89	"	35.0-143	86.8			
1,2,4-Trichlorobenzene	"	3.33		2.92	"	39.0-110	87.7			
Surrogate: 2-FP	"	1.67		1.21	"	19.0-141	72.5			
Surrogate: Phenol-d6	"	1.67		1.18	"	44.0-128	70.7			
Surrogate: 2,4,6-TBP	"	1.67		2.01	"	10.0-137	120			
Surrogate: Nitrobenzene-d5	"	1.67		1.35	"	33.0-108	80.8			
Surrogate: 2-FBP	"	1.67		1.41	"	51.0-124	84.4			
Surrogate: p-Terphenyl-d14	"	1.67		1.69	"	48.0-149	101			
Matrix Spike										
0880681-MS1 B808411-05										
Acenaphthene	8/26/98	3.97	ND	2.93	mg/kg dry	34.0-122	73.8			
4-Chloro-3-methylphenol	"	7.93	ND	6.29	"	26.0-129	79.3			
2-Chlorophenol	"	7.93	ND	5.30	"	43.0-131	66.8			
1,4-Dichlorobenzene	"	3.97	ND	2.98	"	34.0-131	75.1			
2,4-Dinitrotoluene	"	3.97	ND	3.12	"	10.0-126	78.6			
4-Nitrophenol	"	7.93	ND	5.63	"	10.0-111	71.0			
N-Nitrosodi-n-propylamine	"	3.97	ND	2.81	"	29.0-160	70.8			
Pentachlorophenol	"	7.93	ND	7.39	"	46.0-120	93.2			
Phenol	"	7.93	ND	5.06	"	41.0-118	63.8			
Pyrene	"	3.97	ND	3.85	"	44.0-122	97.0			
1,2,4-Trichlorobenzene	"	3.97	ND	3.63	"	10.0-176	91.4			
Surrogate: 2-FP	"	1.98		1.50	"	19.0-141	75.8			
Surrogate: Phenol-d6	"	1.98		1.48	"	44.0-128	74.7			
Surrogate: 2,4,6-TBP	"	1.98		2.43	"	10.0-137	123			
Surrogate: Nitrobenzene-d5	"	1.98		1.68	"	33.0-108	84.8			
Surrogate: 2-FBP	"	1.98		1.90	"	51.0-124	96.0			
Surrogate: p-Terphenyl-d14	"	1.98		2.30	"	48.0-149	116			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 96 of 99

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Matrix Spike Dup	0880681-MSD1	B808411-05								
Acenaphthene	8/26/98	3.97	ND	2.79	mg/kg dry	34.0-122	70.3	56.0	4.86	
4-Chloro-3-methylphenol	"	7.93	ND	5.95	"	26.0-129	75.0	29.0	5.57	
2-Chlorophenol	"	7.93	ND	5.18	"	43.0-131	65.3	27.0	2.27	
1,4-Dichlorobenzene	"	3.97	ND	2.99	"	34.0-131	75.3	23.0	0.266	
2,4-Dinitrotoluene	"	3.97	ND	2.96	"	10.0-126	74.6	22.0	5.22	
4-Nitrophenol	"	7.93	ND	5.05	"	10.0-111	63.7	43.0	10.8	
N-Nitrosodi-n-propylamine	"	3.97	ND	2.80	"	29.0-160	70.5	25.0	0.425	
Pentachlorophenol	"	7.93	ND	7.40	"	46.0-120	93.3	29.0	0.107	
Phenol	"	7.93	ND	4.91	"	41.0-118	61.9	29.0	3.02	
Pyrene	"	3.97	ND	3.45	"	44.0-122	86.9	31.0	11.0	
1,2,4-Trichlorobenzene	"	3.97	ND	3.46	"	10.0-176	87.2	24.0	4.70	
Surrogate: 2-FP	"	1.98		1.49	"	19.0-141	75.3			
Surrogate: Phenol-d6	"	1.98		1.47	"	44.0-128	74.2			
Surrogate: 2,4,6-TBP	"	1.98		2.28	"	10.0-137	115			
Surrogate: Nitrobenzene-d5	"	1.98		1.56	"	33.0-108	78.8			
Surrogate: 2-FBP	"	1.98		1.83	"	51.0-124	92.4			
Surrogate: p-Terphenyl-d14	"	1.98		2.03	"	48.0-149	103			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Notes and Definitions

#	Note
1	Results in the diesel organics range are primarily due to overlap from a heavy oil range product.
2	To reduce matrix interference, the sample extract has undergone florisil clean-up, method 3620, which is specific to non-polar compound contamination.
3	The reporting limit for this analyte has been raised to account for matrix interference.
4	The surrogate recovery for this sample is outside of established control limits. Review of associated QC indicates the recovery for this surrogate does not represent an out-of-control condition.
5	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
6	The reporting limit for this analyte has been raised due to interfering extraction background peaks.
7	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
8	Due to matrix interference with the internal standard associated with this analyte, the reported result should be considered an approximate value.
9	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.
10	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
11	The RPD value for this QC sample is above the established control limit. Review of associated QC indicates the high RPD does not represent an out-of-control condition for the batch.
12	Visual examination indicates the RPD and/or matrix spike recovery is outside the control limit due to a non-homogeneous sample matrix.
13	The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
14	Analyses are not controlled on matrix spike RPD and/or percent recoveries when the sample concentration is significantly higher than the spike level.
15	Post-digestion Matrix Spike.

North Creek Analytical - Bothell

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 98 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 8/17/98 to 8/20/98
Received: 8/21/98
Reported: 9/25/98 13:58

Notes and Definitions

#	Note
---	------

16 The spike recovery for this QC sample was outside the laboratory's default control limits but within the vendor's published acceptance criteria.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

Recov. Recovery

RPD Relative Percent Difference

North Creek Analytical - Bothell

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 99 of 99



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
090198-BIL-MW3-GW-01	B809089-01	Water	9/1/98
090198-BIL-MW4-GW-01	B809089-02	Water	9/1/98
090298-BIL-MW2-GW-01	B809089-03	Water	9/2/98
090198-BIL-MW5-GW-01	B809089-04	Water	9/1/98
TRIP BLANK	B809089-05	Water	9/1/98

North Creek Analytical - Bothell

*The results in this report apply to the samples analyzed in accordance with the chain of custody document.
This analytical report must be reproduced in its entirety.*

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 1 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01				B809089-01		Water		
Gx Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	ND	mg/l	
Kerosene Range Hydrocarbons	"	"	"		0.630	ND	"	
Diesel Range Hydrocarbons	"	"	"		0.630	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		72.5	%	
090198-BIL-MW4-GW-01				B809089-02		Water		
Gx Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	ND	mg/l	
Kerosene Range Hydrocarbons	"	"	"		0.630	ND	"	
Diesel Range Hydrocarbons	"	"	"		0.630	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		85.0	%	
090298-BIL-MW2-GW-01				B809089-03		Water		
Gx Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	ND	mg/l	
Kerosene Range Hydrocarbons	"	"	"		0.630	ND	"	
Diesel Range Hydrocarbons	"	"	"		0.630	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		81.3	%	
090198-BIL-MW5-GW-01				B809089-04		Water		
Gx Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	ND	mg/l	
Kerosene Range Hydrocarbons	"	"	"		0.630	ND	"	
Diesel Range Hydrocarbons	"	"	"		0.630	ND	"	
Insulating Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Heavy Fuel Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Lube Oil Range Hydrocarbons	"	"	"		0.630	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		82.9	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 2 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Petroleum Products by NWTPH-Gx North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
<u>090198-BIL-MW3-GW-01</u>								
				<u>B809089-01</u>		<u>Water</u>		
Gasoline Range Hydrocarbons	0980148	9/4/98	9/4/98		50.0	ND	ug/l	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		119	%	
<u>090198-BIL-MW4-GW-01</u>								
				<u>B809089-02</u>		<u>Water</u>		
Gasoline Range Hydrocarbons	0980148	9/4/98	9/4/98		50.0	ND	ug/l	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		129	%	
<u>090298-BIL-MW2-GW-01</u>								
				<u>B809089-03</u>		<u>Water</u>		
Gasoline Range Hydrocarbons	0980148	9/4/98	9/4/98		50.0	ND	ug/l	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		124	%	
<u>090198-BIL-MW5-GW-01</u>								
				<u>B809089-04</u>		<u>Water</u>		
Gasoline Range Hydrocarbons	0980148	9/4/98	9/4/98		50.0	ND	ug/l	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		125	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
<u>090198-BIL-MW3-GW-01</u>								
				<u>B809089-01</u>				
Diesel Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	ND	mg/l	
Lube Oil Range Hydrocarbons	"	"	"		0.500	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		72.5	%	
<u>090198-BIL-MW4-GW-01</u>								
				<u>B809089-02</u>				
Diesel Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	0.332	mg/l	
Lube Oil Range Hydrocarbons	"	"	"		0.500	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		85.0	%	
<u>090298-BIL-MW2-GW-01</u>								
				<u>B809089-03</u>				
Diesel Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	0.502	mg/l	
Lube Oil Range Hydrocarbons	"	"	"		0.500	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		81.3	%	
<u>090198-BIL-MW5-GW-01</u>								
				<u>B809089-04</u>				
Diesel Range Hydrocarbons	0980181	9/5/98	9/8/98		0.250	0.340	mg/l	
Lube Oil Range Hydrocarbons	"	"	"		0.500	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		82.9	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01				B809089-01			Water	
Calcium	0980557	9/17/98	9/22/98	EPA 6010B	0.250	20.7	mg/l	
Iron	"	"	"	EPA 6010B	0.150	ND	"	
Magnesium	"	"	"	EPA 6010B	0.100	6.49	"	
Potassium	"	"	"	EPA 6010B	0.200	1.54	"	
Sodium	"	"	"	EPA 6010B	0.500	5.89	"	
Antimony	0980333	9/10/98	9/11/98	EPA 6020	0.00100	ND	"	
Arsenic	"	"	"	EPA 6020	0.00100	ND	"	
Barium	"	"	"	EPA 6020	0.0100	0.0233	"	
Beryllium	"	"	"	EPA 6020	0.00100	ND	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00111	"	
Cobalt	"	"	"	EPA 6020	0.00100	ND	"	
Copper	"	"	"	EPA 6020	0.00100	0.00185	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Manganese	"	"	"	EPA 6020	0.00100	0.348	"	
Nickel	"	"	"	EPA 6020	0.00100	0.00247	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Thallium	"	"	"	EPA 6020	0.00100	ND	"	
Vanadium	"	"	"	EPA 6020	0.00100	ND	"	
Zinc	"	"	"	EPA 6020	0.0100	ND	"	
Mercury	0980414	9/14/98	9/15/98	EPA 7470A	0.00100	ND	"	
Aluminum	0980533	9/23/98	9/23/98	EPA 6020	0.0500	0.107	"	
090198-BIL-MW4-GW-01				B809089-02			Water	
Calcium	0980557	9/17/98	9/22/98	EPA 6010B	0.250	72.6	mg/l	
Iron	"	"	"	EPA 6010B	0.150	11.0	"	
Magnesium	"	"	"	EPA 6010B	0.100	16.4	"	
Potassium	"	"	"	EPA 6010B	0.200	4.70	"	
Sodium	"	"	"	EPA 6010B	0.500	9.26	"	
Antimony	0980333	9/10/98	9/11/98	EPA 6020	0.00100	ND	"	
Arsenic	"	"	"	EPA 6020	0.00100	0.00228	"	
Barium	"	"	"	EPA 6020	0.0100	0.264	"	
Beryllium	"	"	"	EPA 6020	0.00100	ND	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00350	"	
Cobalt	"	"	"	EPA 6020	0.00100	0.00553	"	
Copper	"	"	"	EPA 6020	0.00100	0.00761	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and defin.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 5 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01 (continued)				B809089-02			Water	
Lead	0980333	9/10/98	9/11/98	EPA 6020	0.00100	0.0123	mg/l	
Manganese	"	"	9/12/98	EPA 6020	0.0100	2.49	"	
Nickel	"	"	9/11/98	EPA 6020	0.00100	0.00939	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Thallium	"	"	"	EPA 6020	0.00100	ND	"	
Vanadium	"	"	"	EPA 6020	0.00100	0.00691	"	
Zinc	"	"	"	EPA 6020	0.0100	0.0237	"	
Mercury	0980414	9/14/98	9/15/98	EPA 7470A	0.00100	ND	"	
Aluminum	0980533	9/23/98	9/23/98	EPA 6020	0.250	1.46	"	
090298-BIL-MW2-GW-01				B809089-03			Water	
Calcium	0980557	9/17/98	9/22/98	EPA 6010B	0.250	4.51	mg/l	
Iron	"	"	"	EPA 6010B	0.150	4.34	"	
Magnesium	"	"	"	EPA 6010B	0.100	1.17	"	
Potassium	"	"	"	EPA 6010B	0.200	5.15	"	
Sodium	"	"	"	EPA 6010B	0.500	49.2	"	
Antimony	0980333	9/10/98	9/11/98	EPA 6020	0.00100	0.00108	"	
Arsenic	"	"	"	EPA 6020	0.00100	0.00808	"	
Barium	"	"	"	EPA 6020	0.0100	0.128	"	
Beryllium	"	"	"	EPA 6020	0.00100	ND	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00351	"	
Cobalt	"	"	"	EPA 6020	0.00100	0.00163	"	
Copper	"	"	"	EPA 6020	0.00100	0.00567	"	
Lead	"	"	"	EPA 6020	0.00100	0.00771	"	
Manganese	"	"	"	EPA 6020	0.00100	0.0987	"	
Nickel	"	"	"	EPA 6020	0.00100	0.00246	"	
Selenium	"	"	"	EPA 6020	0.00100	0.00148	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Thallium	"	"	"	EPA 6020	0.00100	ND	"	
Vanadium	"	"	"	EPA 6020	0.00100	0.0119	"	
Zinc	"	"	"	EPA 6020	0.0100	0.0268	"	
Mercury	0980414	9/14/98	9/15/98	EPA 7470A	0.00100	ND	"	
Aluminum	0980533	9/23/98	9/23/98	EPA 6020	0.250	3.48	"	
090198-BIL-MW5-GW-01				B809089-04			Water	
Calcium	0980557	9/17/98	9/22/98	EPA 6010B	0.250	72.9	mg/l	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 6 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01 (continued)				B809089-04			Water	
Iron	0980557	9/17/98	9/22/98	EPA 6010B	0.150	8.88	mg/l	
Magnesium	"	"	"	EPA 6010B	0.100	16.7	"	
Potassium	"	"	"	EPA 6010B	0.200	4.91	"	
Sodium	"	"	"	EPA 6010B	0.500	10.3	"	
Antimony	0980333	9/10/98	9/11/98	EPA 6020	0.00100	ND	"	
Arsenic	"	"	"	EPA 6020	0.00100	0.00261	"	
Barium	"	"	"	EPA 6020	0.0100	0.249	"	
Beryllium	"	"	"	EPA 6020	0.00100	ND	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00345	"	
Cobalt	"	"	"	EPA 6020	0.00100	0.00562	"	
Copper	"	"	"	EPA 6020	0.00100	0.00730	"	
Lead	"	"	"	EPA 6020	0.00100	0.0108	"	
Manganese	"	"	9/12/98	EPA 6020	0.0100	2.68	"	
Nickel	"	"	9/11/98	EPA 6020	0.00100	0.00902	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Thallium	"	"	"	EPA 6020	0.00100	ND	"	
Vanadium	"	"	"	EPA 6020	0.00100	0.00663	"	
Zinc	"	"	"	EPA 6020	0.0100	0.0238	"	
Mercury	0980414	9/14/98	9/15/98	EPA 7470A	0.00100	ND	"	
Aluminum	0980533	9/23/98	9/23/98	EPA 6020	0.250	1.63	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
<u>090198-BIL-MW3-GW-01</u>				<u>B809089-01</u>			<u>Water</u>	
Aldrin	0980180	9/5/98	9/24/98		0.0400	ND	ug/l	
alpha-BHC	"	"	"		0.0200	ND	"	
beta-BHC	"	"	"		0.0300	ND	"	
delta-BHC	"	"	"		0.0200	ND	"	
gamma-BHC (Lindane)	"	"	"		0.0300	ND	"	
Chlordane (tech)	"	"	"		0.150	ND	"	
alpha-Chlordane	"	"	"		0.0200	ND	"	
gamma-Chlordane	"	"	"		0.0200	ND	"	
4,4'-DDD	"	"	"		0.0400	ND	"	
4,4'-DDE	"	"	"		0.0300	ND	"	
4,4'-DDT	"	"	"		0.0900	ND	"	
Dieldrin	"	"	"		0.0700	ND	"	
Endosulfan I	"	"	"		0.0300	ND	"	
Endosulfan II	"	"	"		0.0500	ND	"	
Endosulfan sulfate	"	"	"		0.0700	ND	"	
Endrin	"	"	"		0.0800	ND	"	
Endrin aldehyde	"	"	"		0.0800	ND	"	
Heptachlor	"	"	"		0.0300	ND	"	
Heptachlor epoxide	"	"	"		0.0300	ND	"	
Methoxychlor	"	"	"		0.500	ND	"	
Toxaphene	"	"	"		1.50	ND	"	
Aroclor 1016	"	"	"		0.100	ND	"	
Aroclor 1221	"	"	"		0.100	ND	"	
Aroclor 1232	"	"	"		0.100	ND	"	
Aroclor 1242	"	"	"		0.100	ND	"	
Aroclor 1248	"	"	"		0.100	ND	"	
Aroclor 1254	"	"	"		0.100	ND	"	
Aroclor 1260	"	"	"		0.100	ND	"	
Aroclor 1262	"	"	"		0.100	ND	"	
Aroclor 1268	"	"	"		0.100	ND	"	
Surrogate: TCX	"	"	"	40.0-130		81.5	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N E, Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 8 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 9/1/98 to 9/2/98 Received: 9/3/98 Reported: 9/28/98 17:46
--	---	--

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01				B809089-02			Water	
Aldrin	0980180	9/5/98	9/24/98		0.0400	ND	ug/l	
alpha-BHC	"	"	"		0.0200	ND	"	
beta-BHC	"	"	"		0.0300	ND	"	
delta-BHC	"	"	"		0.0200	ND	"	
gamma-BHC (Lindane)	"	"	"		0.0300	ND	"	
Chlordane (tech)	"	"	"		0.150	ND	"	
alpha-Chlordane	"	"	"		0.0200	ND	"	
gamma-Chlordane	"	"	"		0.0200	ND	"	
4,4'-DDD	"	"	"		0.0400	ND	"	
4,4'-DDE	"	"	"		0.0300	ND	"	
4,4'-DDT	"	"	"		0.0900	ND	"	
Dieldrin	"	"	"		0.0700	ND	"	
Endosulfan I	"	"	"		0.0300	ND	"	
Endosulfan II	"	"	"		0.0500	ND	"	
Endosulfan sulfate	"	"	"		0.0700	ND	"	
Endrin	"	"	"		0.0800	ND	"	
Endrin aldehyde	"	"	"		0.0800	ND	"	
Heptachlor	"	"	"		0.0300	ND	"	
Heptachlor epoxide	"	"	"		0.0300	ND	"	
Methoxychlor	"	"	"		0.500	ND	"	
Toxaphene	"	"	"		1.50	ND	"	
Aroclor 1016	"	"	"		0.100	ND	"	
Aroclor 1221	"	"	"		0.100	ND	"	
Aroclor 1232	"	"	"		0.100	ND	"	
Aroclor 1242	"	"	"		0.100	ND	"	
Aroclor 1248	"	"	"		0.100	ND	"	
Aroclor 1254	"	"	"		0.100	ND	"	
Aroclor 1260	"	"	"		0.100	ND	"	
Aroclor 1262	"	"	"		0.100	ND	"	
Aroclor 1268	"	"	"		0.100	ND	"	
Surrogate: TCX	"	"	"	40.0-130		77.5	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 9 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090298-BIL-MW2-GW-01				B809089-03			Water	
Aldrin	0980180	9/5/98	9/24/98		0.0400	ND	ug/l	
alpha-BHC	"	"	"		0.0200	ND	"	
beta-BHC	"	"	"		0.0300	ND	"	
delta-BHC	"	"	"		0.0200	ND	"	
gamma-BHC (Lindane)	"	"	"		0.0300	ND	"	
Chlordane (tech)	"	"	"		0.150	ND	"	
alpha-Chlordane	"	"	"		0.0200	ND	"	
gamma-Chlordane	"	"	"		0.0200	ND	"	
4,4'-DDD	"	"	"		0.0400	ND	"	
4,4'-DDE	"	"	"		0.0300	ND	"	
4,4'-DDT	"	"	"		0.0900	ND	"	
Dieldrin	"	"	"		0.0700	ND	"	
Endosulfan I	"	"	"		0.0300	ND	"	
Endosulfan II	"	"	"		0.0500	ND	"	
Endosulfan sulfate	"	"	"		0.0700	ND	"	
Endrin	"	"	"		0.0800	ND	"	
Endrin aldehyde	"	"	"		0.0800	ND	"	
Heptachlor	"	"	"		0.0300	ND	"	
Heptachlor epoxide	"	"	"		0.0300	ND	"	
Methoxychlor	"	"	"		0.500	ND	"	
Toxaphene	"	"	"		1.50	ND	"	
Aroclor 1016	"	"	"		0.100	ND	"	
Aroclor 1221	"	"	"		0.100	ND	"	
Aroclor 1232	"	"	"		0.100	ND	"	
Aroclor 1242	"	"	"		0.100	ND	"	
Aroclor 1248	"	"	"		0.100	ND	"	
Aroclor 1254	"	"	"		0.100	ND	"	
Aroclor 1260	"	"	"		0.100	ND	"	
Aroclor 1262	"	"	"		0.100	ND	"	
Aroclor 1268	"	"	"		0.100	ND	"	
Surrogate: TCX	"	"	"	40.0-130		60.8	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082 North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01				B809089-04		Water		
Aldrin	0980180	9/5/98	9/24/98		0.0400	ND	ug/l	
alpha-BHC	"	"	"		0.0200	ND	"	
beta-BHC	"	"	"		0.0300	ND	"	
delta-BHC	"	"	"		0.0200	ND	"	
gamma-BHC (Lindane)	"	"	"		0.0300	ND	"	
Chlordane (tech)	"	"	"		0.150	ND	"	
alpha-Chlordane	"	"	"		0.0200	ND	"	
gamma-Chlordane	"	"	"		0.0200	ND	"	
4,4'-DDD	"	"	"		0.0400	ND	"	
4,4'-DDE	"	"	"		0.0300	ND	"	
4,4'-DDT	"	"	"		0.0900	ND	"	
Dieldrin	"	"	"		0.0700	ND	"	
Endosulfan I	"	"	"		0.0300	ND	"	
Endosulfan II	"	"	"		0.0500	ND	"	
Endosulfan sulfate	"	"	"		0.0700	ND	"	
Endrin	"	"	"		0.0800	ND	"	
Endrin aldehyde	"	"	"		0.0800	ND	"	
Heptachlor	"	"	"		0.0300	ND	"	
Heptachlor epoxide	"	"	"		0.0300	ND	"	
Methoxychlor	"	"	"		0.500	ND	"	
Toxaphene	"	"	"		1.50	ND	"	
Aroclor 1016	"	"	"		0.100	ND	"	
Aroclor 1221	"	"	"		0.100	ND	"	
Aroclor 1232	"	"	"		0.100	ND	"	
Aroclor 1242	"	"	"		0.100	ND	"	
Aroclor 1248	"	"	"		0.100	ND	"	
Aroclor 1254	"	"	"		0.100	ND	"	
Aroclor 1260	"	"	"		0.100	ND	"	
Aroclor 1262	"	"	"		0.100	ND	"	
Aroclor 1268	"	"	"		0.100	ND	"	
Surrogate: TCX	"	"	"	40.0-130		75.0	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01		B809089-01				Water		
2,4-D	0980213	9/8/98	9/22/98		0.500	ND	ug/l	
2,4-DB	"	"	"		1.00	ND	"	
2,4,5-T	"	"	"		1.00	ND	"	
2,4,5-TP (Silvex)	"	"	"		1.00	ND	"	
Dalapon	"	"	"		1.50	ND	"	
Dicamba	"	"	"		0.500	ND	"	
Dichlorprop	"	"	"		1.00	ND	"	
Dinoseb	"	"	"		1.00	ND	"	
MCPA	"	"	"		50.0	ND	"	
MCPP	"	"	"		50.0	ND	"	
Surrogate: 2,4-DCAA	"	"	"	24.0-135		54.2	%	
090198-BIL-MW4-GW-01		B809089-02				Water		
2,4-D	0980213	9/8/98	9/22/98		0.500	ND	ug/l	
2,4-DB	"	"	"		1.00	ND	"	
2,4,5-T	"	"	"		1.00	ND	"	
2,4,5-TP (Silvex)	"	"	"		1.00	ND	"	
Dalapon	"	"	"		1.50	ND	"	
Dicamba	"	"	"		0.500	ND	"	
Dichlorprop	"	"	"		1.00	ND	"	
Dinoseb	"	"	"		1.00	ND	"	
MCPA	"	"	"		50.0	ND	"	
MCPP	"	"	"		50.0	ND	"	
Surrogate: 2,4-DCAA	"	"	"	24.0-135		82.5	%	
090298-BIL-MW2-GW-01		B809089-03				Water		
2,4-D	0980213	9/8/98	9/22/98		0.500	ND	ug/l	
2,4-DB	"	"	"		1.00	ND	"	
2,4,5-T	"	"	"		1.00	ND	"	
2,4,5-TP (Silvex)	"	"	"		1.00	ND	"	
Dalapon	"	"	"		1.50	ND	"	
Dicamba	"	"	"		0.500	ND	"	
Dichlorprop	"	"	"		1.00	ND	"	
Dinoseb	"	"	"		1.00	ND	"	
MCPA	"	"	"		50.0	ND	"	
MCPP	"	"	"		50.0	ND	"	
Surrogate: 2,4-DCAA	"	"	"	24.0-135		66.3	%	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N E, Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 12 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Chlorinated Herbicides by EPA Method 8151A North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01				B809089-04			Water	
2,4-D	0980213	9/8/98	9/22/98		0.500	ND	ug/l	
2,4-DB	"	"	"		1.00	ND	"	
2,4,5-T	"	"	"		1.00	ND	"	
2,4,5-TP (Silvex)	"	"	"		1.00	ND	"	
Dalapon	"	"	"		1.50	ND	"	
Dicamba	"	"	"		0.500	ND	"	
Dichlorprop	"	"	"		1.00	ND	"	
Dinoseb	"	"	"		1.00	ND	"	
MCPA	"	"	"		50.0	ND	"	
MCPP	"	"	"		50.0	ND	"	
Surrogate: 2,4-DCAA	"	"	"	24.0-135		81.4	%	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01				B809089-01			Water	
Acetone	0980188	9/5/98	9/5/98		10.0	ND	ug/l	
Benzene	"	"	"		1.00	ND	"	
Bromobenzene	"	"	"		1.00	ND	"	
Bromochloromethane	"	"	"		1.00	ND	"	
Bromodichloromethane	"	"	"		1.00	ND	"	
Bromoform	"	"	"		1.00	ND	"	
Bromomethane	"	"	"		1.00	ND	"	
2-Butanone	"	"	"		10.0	ND	"	
n-Butylbenzene	"	"	"		1.00	ND	"	
sec-Butylbenzene	"	"	"		1.00	ND	"	
tert-Butylbenzene	"	"	"		1.00	ND	"	
Carbon disulfide	"	"	"		1.00	ND	"	
Carbon tetrachloride	"	"	"		1.00	ND	"	
Chlorobenzene	"	"	"		1.00	ND	"	
Chloroethane	"	"	"		1.00	ND	"	
Chloroform	"	"	"		1.00	ND	"	
Chloromethane	"	"	"		5.00	ND	"	
2-Chlorotoluene	"	"	"		1.00	ND	"	
4-Chlorotoluene	"	"	"		1.00	ND	"	
Dibromochloromethane	"	"	"		1.00	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		5.00	ND	"	
1,2-Dibromoethane	"	"	"		1.00	ND	"	
Dibromomethane	"	"	"		1.00	ND	"	
1,2-Dichlorobenzene	"	"	"		1.00	ND	"	
1,3-Dichlorobenzene	"	"	"		1.00	ND	"	
1,4-Dichlorobenzene	"	"	"		1.00	ND	"	
Dichlorodifluoromethane	"	"	"		1.00	ND	"	
1,1-Dichloroethane	"	"	"		1.00	ND	"	
1,2-Dichloroethane	"	"	"		1.00	ND	"	
1,1-Dichloroethene	"	"	"		1.00	ND	"	
cis-1,2-Dichloroethene	"	"	"		1.00	ND	"	
trans-1,2-Dichloroethene	"	"	"		1.00	ND	"	
1,2-Dichloropropane	"	"	"		1.00	ND	"	
1,3-Dichloropropane	"	"	"		1.00	ND	"	
2,2-Dichloropropane	"	"	"		1.00	ND	"	
1,1-Dichloropropene	"	"	"		1.00	ND	"	
cis-1,3-Dichloropropene	"	"	"		1.00	ND	"	
trans-1,3-Dichloropropene	"	"	"		1.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 14 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01 (continued)				B809089-01		Water		
Ethylbenzene	0980188	9/5/98	9/5/98		1.00	ND	ug/l	
Hexachlorobutadiene	"	"	"		1.00	ND	"	
2-Hexanone	"	"	"		10.0	ND	"	
Isopropylbenzene	"	"	"		1.00	ND	"	
p-Isopropyltoluene	"	"	"		1.00	ND	"	
Methylene chloride	"	"	"		5.00	ND	"	
4-Methyl-2-pentanone	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		1.00	ND	"	
n-Propylbenzene	"	"	"		1.00	ND	"	
Styrene	"	"	"		1.00	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		1.00	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		1.00	ND	"	
Tetrachloroethene	"	"	"		1.00	6.62	"	
Toluene	"	"	"		1.00	ND	"	
1,2,3-Trichlorobenzene	"	"	"		1.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		1.00	ND	"	
1,1,1-Trichloroethane	"	"	"		1.00	ND	"	
1,1,2-Trichloroethane	"	"	"		1.00	ND	"	
Trichloroethene	"	"	"		1.00	ND	"	
Trichlorofluoromethane	"	"	"		1.00	ND	"	
1,2,3-Trichloropropane	"	"	"		1.00	ND	"	
1,2,4-Trimethylbenzene	"	"	"		1.00	ND	"	
1,3,5-Trimethylbenzene	"	"	"		1.00	ND	"	
Vinyl chloride	"	"	"		1.00	ND	"	
m,p-Xylene	"	"	"		2.00	ND	"	
o-Xylene	"	"	"		1.00	ND	"	
Surrogate: 2-Bromopropene	"	"	"	80.0-120		95.0	%	
Surrogate: 1,2-DCA-d4	"	"	"	80.0-120		109	"	
Surrogate: Toluene-d8	"	"	"	80.0-120		95.0	"	
Surrogate: 4-BFB	"	"	"	80.0-120		99.5	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 15 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01				B809089-02			Water	
Acetone	0980188	9/5/98	9/5/98		10.0	ND	ug/l	
Benzene	"	"	"		1.00	ND	"	
Bromobenzene	"	"	"		1.00	ND	"	
Bromochloromethane	"	"	"		1.00	ND	"	
Bromodichloromethane	"	"	"		1.00	ND	"	
Bromoform	"	"	"		1.00	ND	"	
Bromomethane	"	"	"		1.00	ND	"	
2-Butanone	"	"	"		10.0	ND	"	
n-Butylbenzene	"	"	"		1.00	ND	"	
sec-Butylbenzene	"	"	"		1.00	ND	"	
tert-Butylbenzene	"	"	"		1.00	ND	"	
Carbon disulfide	"	"	"		1.00	ND	"	
Carbon tetrachloride	"	"	"		1.00	ND	"	
Chlorobenzene	"	"	"		1.00	ND	"	
Chloroethane	"	"	"		1.00	ND	"	
Chloroform	"	"	"		1.00	ND	"	
Chloromethane	"	"	"		5.00	ND	"	
2-Chlorotoluene	"	"	"		1.00	ND	"	
4-Chlorotoluene	"	"	"		1.00	ND	"	
Dibromochloromethane	"	"	"		1.00	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		5.00	ND	"	
1,2-Dibromoethane	"	"	"		1.00	ND	"	
Dibromomethane	"	"	"		1.00	ND	"	
1,2-Dichlorobenzene	"	"	"		1.00	ND	"	
1,3-Dichlorobenzene	"	"	"		1.00	ND	"	
1,4-Dichlorobenzene	"	"	"		1.00	ND	"	
Dichlorodifluoromethane	"	"	"		1.00	ND	"	
1,1-Dichloroethane	"	"	"		1.00	ND	"	
1,2-Dichloroethane	"	"	"		1.00	ND	"	
1,1-Dichloroethene	"	"	"		1.00	ND	"	
cis-1,2-Dichloroethene	"	"	"		1.00	ND	"	
trans-1,2-Dichloroethene	"	"	"		1.00	ND	"	
1,2-Dichloropropane	"	"	"		1.00	ND	"	
1,3-Dichloropropane	"	"	"		1.00	ND	"	
2,2-Dichloropropane	"	"	"		1.00	ND	"	
1,1-Dichloropropene	"	"	"		1.00	ND	"	
cis-1,3-Dichloropropene	"	"	"		1.00	ND	"	
trans-1,3-Dichloropropene	"	"	"		1.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

13939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 16 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01 (continued)				B809089-02		Water		
Ethylbenzene	0980188	9/5/98	9/5/98		1.00	ND	ug/l	
Hexachlorobutadiene	"	"	"		1.00	ND	"	
2-Hexanone	"	"	"		10.0	ND	"	
Isopropylbenzene	"	"	"		1.00	ND	"	
p-Isopropyltoluene	"	"	"		1.00	ND	"	
Methylene chloride	"	"	"		5.00	ND	"	
4-Methyl-2-pentanone	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		1.00	ND	"	
n-Propylbenzene	"	"	"		1.00	ND	"	
Styrene	"	"	"		1.00	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		1.00	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		1.00	ND	"	
Tetrachloroethene	"	"	"		1.00	ND	"	
Toluene	"	"	"		1.00	1.11	"	
1,2,3-Trichlorobenzene	"	"	"		1.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		1.00	ND	"	
1,1,1-Trichloroethane	"	"	"		1.00	ND	"	
1,1,2-Trichloroethane	"	"	"		1.00	ND	"	
Trichloroethene	"	"	"		1.00	ND	"	
Trichlorofluoromethane	"	"	"		1.00	ND	"	
1,2,3-Trichloropropane	"	"	"		1.00	ND	"	
1,2,4-Trimethylbenzene	"	"	"		1.00	ND	"	
1,3,5-Trimethylbenzene	"	"	"		1.00	ND	"	
Vinyl chloride	"	"	"		1.00	ND	"	
m,p-Xylene	"	"	"		2.00	ND	"	
o-Xylene	"	"	"		1.00	ND	"	
Surrogate: 2-Bromopropene	"	"	"	80.0-120		94.0	%	
Surrogate: 1,2-DCA-d4	"	"	"	80.0-120		110	"	
Surrogate: Toluene-d8	"	"	"	80.0-120		95.5	"	
Surrogate: 4-BFB	"	"	"	80.0-120		98.5	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 17 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
<u>090298-BIL-MW2-GW-01</u>				<u>B809089-03</u>			<u>Water</u>	
Acetone	0980188	9/5/98	9/5/98		10.0	ND	ug/l	
Benzene	"	"	"		1.00	ND	"	
Bromobenzene	"	"	"		1.00	ND	"	
Bromochloromethane	"	"	"		1.00	ND	"	
Bromodichloromethane	"	"	"		1.00	ND	"	
Bromoform	"	"	"		1.00	ND	"	
Bromomethane	"	"	"		1.00	ND	"	
2-Butanone	"	"	"		10.0	ND	"	
n-Butylbenzene	"	"	"		1.00	ND	"	
sec-Butylbenzene	"	"	"		1.00	ND	"	
tert-Butylbenzene	"	"	"		1.00	ND	"	
Carbon disulfide	"	"	"		1.00	ND	"	
Carbon tetrachloride	"	"	"		1.00	ND	"	
Chlorobenzene	"	"	"		1.00	ND	"	
Chloroethane	"	"	"		1.00	ND	"	
Chloroform	"	"	"		1.00	ND	"	
Chloromethane	"	"	"		5.00	ND	"	
2-Chlorotoluene	"	"	"		1.00	ND	"	
4-Chlorotoluene	"	"	"		1.00	ND	"	
Dibromochloromethane	"	"	"		1.00	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		5.00	ND	"	
1,2-Dibromoethane	"	"	"		1.00	ND	"	
Dibromomethane	"	"	"		1.00	ND	"	
1,2-Dichlorobenzene	"	"	"		1.00	ND	"	
1,3-Dichlorobenzene	"	"	"		1.00	ND	"	
1,4-Dichlorobenzene	"	"	"		1.00	ND	"	
Dichlorodifluoromethane	"	"	"		1.00	ND	"	
1,1-Dichloroethane	"	"	"		1.00	ND	"	
1,2-Dichloroethane	"	"	"		1.00	ND	"	
1,1-Dichloroethene	"	"	"		1.00	ND	"	
cis-1,2-Dichloroethene	"	"	"		1.00	ND	"	
trans-1,2-Dichloroethene	"	"	"		1.00	ND	"	
1,2-Dichloropropane	"	"	"		1.00	ND	"	
1,3-Dichloropropane	"	"	"		1.00	ND	"	
2,2-Dichloropropane	"	"	"		1.00	ND	"	
1,1-Dichloropropene	"	"	"		1.00	ND	"	
cis-1,3-Dichloropropene	"	"	"		1.00	ND	"	
trans-1,3-Dichloropropene	"	"	"		1.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 18 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090298-BIL-MW2-GW-01 (continued)				B809089-03		Water		
Ethylbenzene	0980188	9/5/98	9/5/98		1.00	ND	ug/l	
Hexachlorobutadiene	"	"	"		1.00	ND	"	
2-Hexanone	"	"	"		10.0	ND	"	
Isopropylbenzene	"	"	"		1.00	ND	"	
p-Isopropyltoluene	"	"	"		1.00	ND	"	
Methylene chloride	"	"	"		5.00	5.24	"	1
4-Methyl-2-pentanone	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		1.00	ND	"	
n-Propylbenzene	"	"	"		1.00	ND	"	
Styrene	"	"	"		1.00	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		1.00	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		1.00	ND	"	
Tetrachloroethene	"	"	"		1.00	ND	"	
Toluene	"	"	"		1.00	ND	"	
1,2,3-Trichlorobenzene	"	"	"		1.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		1.00	ND	"	
1,1,1-Trichloroethane	"	"	"		1.00	ND	"	
1,1,2-Trichloroethane	"	"	"		1.00	ND	"	
Trichloroethene	"	"	"		1.00	ND	"	
Trichlorofluoromethane	"	"	"		1.00	ND	"	
1,2,3-Trichloropropane	"	"	"		1.00	ND	"	
1,2,4-Trimethylbenzene	"	"	"		1.00	ND	"	
1,3,5-Trimethylbenzene	"	"	"		1.00	ND	"	
Vinyl chloride	"	"	"		1.00	ND	"	
m,p-Xylene	"	"	"		2.00	ND	"	
o-Xylene	"	"	"		1.00	ND	"	
Surrogate: 2-Bromopropene	"	"	"	80.0-120		92.5	%	
Surrogate: 1,2-DCA-d4	"	"	"	80.0-120		109	"	
Surrogate: Toluene-d8	"	"	"	80.0-120		94.5	"	
Surrogate: 4-BFB	"	"	"	80.0-120		99.5	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01				B809089-04			Water	
Acetone	0980188	9/5/98	9/5/98		10.0	ND	ug/l	
Benzene	"	"	"		1.00	ND	"	
Bromobenzene	"	"	"		1.00	ND	"	
Bromochloromethane	"	"	"		1.00	ND	"	
Bromodichloromethane	"	"	"		1.00	ND	"	
Bromoform	"	"	"		1.00	ND	"	
Bromomethane	"	"	"		1.00	ND	"	
2-Butanone	"	"	"		10.0	ND	"	
n-Butylbenzene	"	"	"		1.00	ND	"	
sec-Butylbenzene	"	"	"		1.00	ND	"	
tert-Butylbenzene	"	"	"		1.00	ND	"	
Carbon disulfide	"	"	"		1.00	ND	"	
Carbon tetrachloride	"	"	"		1.00	ND	"	
Chlorobenzene	"	"	"		1.00	ND	"	
Chloroethane	"	"	"		1.00	ND	"	
Chloroform	"	"	"		1.00	ND	"	
Chloromethane	"	"	"		5.00	ND	"	
2-Chlorotoluene	"	"	"		1.00	ND	"	
4-Chlorotoluene	"	"	"		1.00	ND	"	
Dibromochloromethane	"	"	"		1.00	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		5.00	ND	"	
1,2-Dibromoethane	"	"	"		1.00	ND	"	
Dibromomethane	"	"	"		1.00	ND	"	
1,2-Dichlorobenzene	"	"	"		1.00	ND	"	
1,3-Dichlorobenzene	"	"	"		1.00	ND	"	
1,4-Dichlorobenzene	"	"	"		1.00	ND	"	
Dichlorodifluoromethane	"	"	"		1.00	ND	"	
1,1-Dichloroethane	"	"	"		1.00	ND	"	
1,2-Dichloroethane	"	"	"		1.00	ND	"	
1,1-Dichloroethene	"	"	"		1.00	ND	"	
cis-1,2-Dichloroethene	"	"	"		1.00	ND	"	
trans-1,2-Dichloroethene	"	"	"		1.00	ND	"	
1,2-Dichloropropane	"	"	"		1.00	ND	"	
1,3-Dichloropropane	"	"	"		1.00	ND	"	
2,2-Dichloropropane	"	"	"		1.00	ND	"	
1,1-Dichloropropene	"	"	"		1.00	ND	"	
cis-1,3-Dichloropropene	"	"	"		1.00	ND	"	
trans-1,3-Dichloropropene	"	"	"		1.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 20 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01 (continued)				B809089-04		Water		
Ethylbenzene	0980188	9/5/98	9/5/98		1.00	ND	ug/l	
Hexachlorobutadiene	"	"	"		1.00	ND	"	
2-Hexanone	"	"	"		10.0	ND	"	
Isopropylbenzene	"	"	"		1.00	ND	"	
p-Isopropyltoluene	"	"	"		1.00	ND	"	
Methylene chloride	"	"	"		5.00	ND	"	
4-Methyl-2-pentanone	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		1.00	ND	"	
n-Propylbenzene	"	"	"		1.00	ND	"	
Styrene	"	"	"		1.00	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		1.00	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		1.00	ND	"	
Tetrachloroethene	"	"	"		1.00	ND	"	
Toluene	"	"	"		1.00	ND	"	
1,2,3-Trichlorobenzene	"	"	"		1.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		1.00	ND	"	
1,1,1-Trichloroethane	"	"	"		1.00	ND	"	
1,1,2-Trichloroethane	"	"	"		1.00	ND	"	
Trichloroethene	"	"	"		1.00	ND	"	
Trichlorofluoromethane	"	"	"		1.00	ND	"	
1,2,3-Trichloropropane	"	"	"		1.00	ND	"	
1,2,4-Trimethylbenzene	"	"	"		1.00	ND	"	
1,3,5-Trimethylbenzene	"	"	"		1.00	ND	"	
Vinyl chloride	"	"	"		1.00	ND	"	
m,p-Xylene	"	"	"		2.00	ND	"	
o-Xylene	"	"	"		1.00	ND	"	
Surrogate: 2-Bromopropene	"	"	"	80.0-120		83.0	%	
Surrogate: 1,2-DCA-d4	"	"	"	80.0-120		108	"	
Surrogate: Toluene-d8	"	"	"	80.0-120		94.0	"	
Surrogate: 4-BFB	"	"	"	80.0-120		100	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 21 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
TRIP BLANK				B809089-05			Water	
Acetone	0980188	9/5/98	9/6/98		10.0	ND	ug/l	
Benzene	"	"	"		1.00	ND	"	
Bromobenzene	"	"	"		1.00	ND	"	
Bromochloromethane	"	"	"		1.00	ND	"	
Bromodichloromethane	"	"	"		1.00	ND	"	
Bromoform	"	"	"		1.00	ND	"	
Bromomethane	"	"	"		1.00	ND	"	
2-Butanone	"	"	"		10.0	ND	"	
n-Butylbenzene	"	"	"		1.00	ND	"	
sec-Butylbenzene	"	"	"		1.00	ND	"	
tert-Butylbenzene	"	"	"		1.00	ND	"	
Carbon disulfide	"	"	"		1.00	2.29	"	
Carbon tetrachloride	"	"	"		1.00	ND	"	
Chlorobenzene	"	"	"		1.00	ND	"	
Chloroethane	"	"	"		1.00	ND	"	
Chloroform	"	"	"		1.00	ND	"	
Chloromethane	"	"	"		5.00	ND	"	
2-Chlorotoluene	"	"	"		1.00	ND	"	
4-Chlorotoluene	"	"	"		1.00	ND	"	
Dibromochloromethane	"	"	"		1.00	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		5.00	ND	"	
1,2-Dibromoethane	"	"	"		1.00	ND	"	
Dibromomethane	"	"	"		1.00	ND	"	
1,2-Dichlorobenzene	"	"	"		1.00	ND	"	
1,3-Dichlorobenzene	"	"	"		1.00	ND	"	
1,4-Dichlorobenzene	"	"	"		1.00	ND	"	
Dichlorodifluoromethane	"	"	"		1.00	ND	"	
1,1-Dichloroethane	"	"	"		1.00	ND	"	
1,2-Dichloroethane	"	"	"		1.00	ND	"	
1,1-Dichloroethene	"	"	"		1.00	ND	"	
cis-1,2-Dichloroethene	"	"	"		1.00	ND	"	
trans-1,2-Dichloroethene	"	"	"		1.00	ND	"	
1,2-Dichloropropane	"	"	"		1.00	ND	"	
1,3-Dichloropropane	"	"	"		1.00	ND	"	
2,2-Dichloropropane	"	"	"		1.00	ND	"	
1,1-Dichloropropene	"	"	"		1.00	ND	"	
cis-1,3-Dichloropropene	"	"	"		1.00	ND	"	
trans-1,3-Dichloropropene	"	"	"		1.00	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

13939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 22 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
TRIP BLANK (continued)				B809089-05			Water	
Ethylbenzene	0980188	9/5/98	9/6/98		1.00	ND	ug/l	
Hexachlorobutadiene	"	"	"		1.00	ND	"	
2-Hexanone	"	"	"		10.0	ND	"	
Isopropylbenzene	"	"	"		1.00	ND	"	
p-Isopropyltoluene	"	"	"		1.00	ND	"	
Methylene chloride	"	"	"		5.00	7.91	"	1
4-Methyl-2-pentanone	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		1.00	ND	"	
n-Propylbenzene	"	"	"		1.00	ND	"	
Styrene	"	"	"		1.00	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		1.00	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		1.00	ND	"	
Tetrachloroethene	"	"	"		1.00	ND	"	
Toluene	"	"	"		1.00	ND	"	
1,2,3-Trichlorobenzene	"	"	"		1.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		1.00	ND	"	
1,1,1-Trichloroethane	"	"	"		1.00	ND	"	
1,1,2-Trichloroethane	"	"	"		1.00	ND	"	
Trichloroethene	"	"	"		1.00	ND	"	
Trichlorofluoromethane	"	"	"		1.00	ND	"	
1,2,3-Trichloropropane	"	"	"		1.00	ND	"	
1,2,4-Trimethylbenzene	"	"	"		1.00	ND	"	
1,3,5-Trimethylbenzene	"	"	"		1.00	ND	"	
Vinyl chloride	"	"	"		1.00	ND	"	
m,p-Xylene	"	"	"		2.00	ND	"	
o-Xylene	"	"	"		1.00	ND	"	
Surrogate: 2-Bromopropene	"	"	"	80.0-120		91.0	%	
Surrogate: 1,2-DCA-d4	"	"	"	80.0-120		113	"	
Surrogate: Toluene-d8	"	"	"	80.0-120		95.5	"	
Surrogate: 4-BFB	"	"	"	80.0-120		97.0	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc. 600 University St., Suite 800 Seattle, WA 98101	Project: Bradford Island Landfill Project Number: 10022-03 Project Manager: Carlotta Cellucci	Sampled: 9/1/98 to 9/2/98 Received: 9/3/98 Reported: 9/28/98 17:46
--	---	--

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01				B809089-01			Water	
Acenaphthene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Acenaphthylene	"	"	"		10.0	ND	"	
Aniline	"	"	"		10.0	ND	"	
Anthracene	"	"	"		10.0	ND	"	
Benzoic Acid	"	"	"		20.0	ND	"	
Benzo (a) anthracene	"	"	"		5.00	ND	"	
Benzo (b) fluoranthene	"	"	"		5.00	ND	"	
Benzo (k) fluoranthene	"	"	"		5.00	ND	"	
Benzo (ghi) perylene	"	"	"		5.00	ND	"	
Benzo (a) pyrene	"	"	"		5.00	ND	"	
Benzyl alcohol	"	"	"		10.0	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		10.0	ND	"	
Bis(2-chloroethyl)ether	"	"	"		10.0	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		10.0	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		20.0	ND	"	
4-Bromophenyl phenyl ether	"	"	"		10.0	ND	"	
Butyl benzyl phthalate	"	"	"		5.00	ND	"	
Carbazole	"	"	"		10.0	ND	"	
4-Chloroaniline	"	"	"		5.00	ND	"	
2-Chloronaphthalene	"	"	"		10.0	ND	"	
4-Chloro-3-methylphenol	"	"	"		10.0	ND	"	
2-Chlorophenol	"	"	"		10.0	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		10.0	ND	"	
Chrysene	"	"	"		5.00	ND	"	
Dibenz (a,h) anthracene	"	"	"		5.00	ND	"	
Dibenzofuran	"	"	"		10.0	ND	"	
Di-n-butyl phthalate	"	"	"		5.00	ND	"	
1,3-Dichlorobenzene	"	"	"		5.00	ND	"	
1,4-Dichlorobenzene	"	"	"		5.00	ND	"	
1,2-Dichlorobenzene	"	"	"		5.00	ND	"	
3,3'-Dichlorobenzidine	"	"	"		20.0	ND	"	
2,4-Dichlorophenol	"	"	"		10.0	ND	"	
Diethyl phthalate	"	"	"		10.0	ND	"	
2,4-Dimethylphenol	"	"	"		10.0	ND	"	
Dimethyl phthalate	"	"	"		10.0	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		10.0	ND	"	
2,4-Dinitrophenol	"	"	"		10.0	ND	"	
2,4-Dinitrotoluene	"	"	"		10.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and defin.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 24 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW3-GW-01 (continued)			B809089-01			Water		
2,6-Dinitrotoluene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Di-n-octyl phthalate	"	"	"		5.00	ND	"	
Fluoranthene	"	"	"		5.00	ND	"	
Fluorene	"	"	"		10.0	ND	"	
Hexachlorobenzene	"	"	"		10.0	ND	"	
Hexachlorobutadiene	"	"	"		5.00	ND	"	
Hexachlorocyclopentadiene	"	"	"		5.00	ND	"	
Hexachloroethane	"	"	"		10.0	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		5.00	ND	"	
Isophorone	"	"	"		10.0	ND	"	
2-Methylnaphthalene	"	"	"		10.0	ND	"	
2-Methylphenol	"	"	"		10.0	ND	"	
3 & 4-Methylphenol	"	"	"		10.0	ND	"	
naphthalene	"	"	"		10.0	ND	"	
2-Nitroaniline	"	"	"		20.0	ND	"	
3-Nitroaniline	"	"	"		10.0	ND	"	
4-Nitroaniline	"	"	"		10.0	ND	"	
Nitrobenzene	"	"	"		10.0	ND	"	
2-Nitrophenol	"	"	"		5.00	ND	"	
4-Nitrophenol	"	"	"		10.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		10.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		10.0	ND	"	
Pentachlorophenol	"	"	"		10.0	ND	"	
Phenanthrene	"	"	"		10.0	ND	"	
Phenol	"	"	"		10.0	ND	"	
Pyrene	"	"	"		5.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		5.00	ND	"	
2,4,5-Trichlorophenol	"	"	"		10.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		10.0	ND	"	
Surrogate: 2-FP	"	"	"	40.0-115		58.0	%	
Surrogate: Phenol-d6	"	"	"	18.0-145		58.2	"	
Surrogate: 2,4,6-TBP	"	"	"	24.0-130		74.8	"	
Surrogate: Nitrobenzene-d5	"	"	"	42.0-110		67.0	"	
Surrogate: 2-FBP	"	"	"	46.0-116		84.5	"	
Surrogate: p-Terphenyl-d14	"	"	"	63.0-117		89.5	"	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
 SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
 PORTLAND ■ (503) 906-9200 ■ FAX 906-9211

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01				B809089-02			Water	
Acenaphthene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Acenaphthylene	"	"	"		10.0	ND	"	
Aniline	"	"	"		10.0	ND	"	
Anthracene	"	"	"		10.0	ND	"	
Benzoic Acid	"	"	"		20.0	ND	"	
Benzo (a) anthracene	"	"	"		5.00	ND	"	
Benzo (b) fluoranthene	"	"	"		5.00	ND	"	
Benzo (k) fluoranthene	"	"	"		5.00	ND	"	
Benzo (ghi) perylene	"	"	"		5.00	ND	"	
Benzo (a) pyrene	"	"	"		5.00	ND	"	
Benzyl alcohol	"	"	"		10.0	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		10.0	ND	"	
Bis(2-chloroethyl)ether	"	"	"		10.0	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		10.0	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		20.0	ND	"	
4-Bromophenyl phenyl ether	"	"	"		10.0	ND	"	
Butyl benzyl phthalate	"	"	"		5.00	ND	"	
Carbazole	"	"	"		10.0	ND	"	
4-Chloroaniline	"	"	"		5.00	ND	"	
2-Chloronaphthalene	"	"	"		10.0	ND	"	
4-Chloro-3-methylphenol	"	"	"		10.0	ND	"	
2-Chlorophenol	"	"	"		10.0	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		10.0	ND	"	
Chrysene	"	"	"		5.00	ND	"	
Dibenz (a,h) anthracene	"	"	"		5.00	ND	"	
Dibenzofuran	"	"	"		10.0	ND	"	
Di-n-butyl phthalate	"	"	"		5.00	ND	"	
1,3-Dichlorobenzene	"	"	"		5.00	ND	"	
1,4-Dichlorobenzene	"	"	"		5.00	ND	"	
1,2-Dichlorobenzene	"	"	"		5.00	ND	"	
3,3'-Dichlorobenzidine	"	"	"		20.0	ND	"	
2,4-Dichlorophenol	"	"	"		10.0	ND	"	
Diethyl phthalate	"	"	"		10.0	ND	"	
2,4-Dimethylphenol	"	"	"		10.0	ND	"	
Dimethyl phthalate	"	"	"		10.0	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		10.0	ND	"	
2,4-Dinitrophenol	"	"	"		10.0	ND	"	
2,4-Dinitrotoluene	"	"	"		10.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
 East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
 9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 26 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW4-GW-01 (continued)				B809089-02		Water		
2,6-Dinitrotoluene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Di-n-octyl phthalate	"	"	"		5.00	ND	"	
Fluoranthene	"	"	"		5.00	ND	"	
Fluorene	"	"	"		10.0	ND	"	
Hexachlorobenzene	"	"	"		10.0	ND	"	
Hexachlorobutadiene	"	"	"		5.00	ND	"	
Hexachlorocyclopentadiene	"	"	"		5.00	ND	"	
Hexachloroethane	"	"	"		10.0	ND	"	
Indeno (1.2.3-cd) pyrene	"	"	"		5.00	ND	"	
Isophorone	"	"	"		10.0	ND	"	
2-Methylnaphthalene	"	"	"		10.0	ND	"	
2-Methylphenol	"	"	"		10.0	ND	"	
3 & 4-Methylphenol	"	"	"		10.0	ND	"	
Naphthalene	"	"	"		10.0	ND	"	
2-Nitroaniline	"	"	"		20.0	ND	"	
3-Nitroaniline	"	"	"		10.0	ND	"	
4-Nitroaniline	"	"	"		10.0	ND	"	
Nitrobenzene	"	"	"		10.0	ND	"	
2-Nitrophenol	"	"	"		5.00	ND	"	
4-Nitrophenol	"	"	"		10.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		10.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		10.0	ND	"	
Pentachlorophenol	"	"	"		10.0	ND	"	
Phenanthrene	"	"	"		10.0	ND	"	
Phenol	"	"	"		10.0	ND	"	
Pyrene	"	"	"		5.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		5.00	ND	"	
2,4,5-Trichlorophenol	"	"	"		10.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		10.0	ND	"	
Surrogate: 2-FP	"	"	"	40.0-115		46.0	%	
Surrogate: Phenol-d6	"	"	"	18.0-145		56.1	"	
Surrogate: 2,4,6-TBP	"	"	"	24.0-130		80.3	"	
Surrogate: Nitrobenzene-d5	"	"	"	42.0-110		60.3	"	
Surrogate: 2-FBP	"	"	"	46.0-116		72.9	"	
Surrogate: p-Terphenyl-d14	"	"	"	63.0-117		95.4	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 27 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090298-BIL-MW2-GW-01				B809089-03			Water	
Acenaphthene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Acenaphthylene	"	"	"		10.0	ND	"	
Aniline	"	"	"		10.0	ND	"	
Anthracene	"	"	"		10.0	ND	"	
Benzoic Acid	"	"	"		20.0	ND	"	
Benzo (a) anthracene	"	"	"		5.00	ND	"	
Benzo (b) fluoranthene	"	"	"		5.00	ND	"	
Benzo (k) fluoranthene	"	"	"		5.00	ND	"	
Benzo (ghi) perylene	"	"	"		5.00	ND	"	
Benzo (a) pyrene	"	"	"		5.00	ND	"	
Benzyl alcohol	"	"	"		10.0	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		10.0	ND	"	
Bis(2-chloroethyl)ether	"	"	"		10.0	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		10.0	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		20.0	ND	"	
4-Bromophenyl phenyl ether	"	"	"		10.0	ND	"	
Butyl benzyl phthalate	"	"	"		5.00	ND	"	
Carbazole	"	"	"		10.0	ND	"	
4-Chloroaniline	"	"	"		5.00	ND	"	
2-Chloronaphthalene	"	"	"		10.0	ND	"	
4-Chloro-3-methylphenol	"	"	"		10.0	ND	"	
2-Chlorophenol	"	"	"		10.0	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		10.0	ND	"	
Chrysene	"	"	"		5.00	ND	"	
Dibenz (a,h) anthracene	"	"	"		5.00	ND	"	
Dibenzofuran	"	"	"		10.0	ND	"	
Di-n-butyl phthalate	"	"	"		5.00	ND	"	
1,3-Dichlorobenzene	"	"	"		5.00	ND	"	
1,4-Dichlorobenzene	"	"	"		5.00	ND	"	
1,2-Dichlorobenzene	"	"	"		5.00	ND	"	
3,3'-Dichlorobenzidine	"	"	"		20.0	ND	"	
2,4-Dichlorophenol	"	"	"		10.0	ND	"	
Diethyl phthalate	"	"	"		10.0	ND	"	
2,4-Dimethylphenol	"	"	"		10.0	ND	"	
Dimethyl phthalate	"	"	"		10.0	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		10.0	ND	"	
2,4-Dinitrophenol	"	"	"		10.0	ND	"	
2,4-Dinitrotoluene	"	"	"		10.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 28 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090298-BIL-MW2-GW-01 (continued)			B809089-03			Water		
2,6-Dinitrotoluene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Di-n-octyl phthalate	"	"	"		5.00	ND	"	
Fluoranthene	"	"	"		5.00	ND	"	
Fluorene	"	"	"		10.0	ND	"	
Hexachlorobenzene	"	"	"		10.0	ND	"	
Hexachlorobutadiene	"	"	"		5.00	ND	"	
Hexachlorocyclopentadiene	"	"	"		5.00	ND	"	
Hexachloroethane	"	"	"		10.0	ND	"	
Indeno (1.2.3-cd) pyrene	"	"	"		5.00	ND	"	
Isophorone	"	"	"		10.0	ND	"	
2-Methylnaphthalene	"	"	"		10.0	ND	"	
2-Methylphenol	"	"	"		10.0	ND	"	
3 & 4-Methylphenol	"	"	"		10.0	ND	"	
naphthalene	"	"	"		10.0	ND	"	
2-Nitroaniline	"	"	"		20.0	ND	"	
3-Nitroaniline	"	"	"		10.0	ND	"	
4-Nitroaniline	"	"	"		10.0	ND	"	
Nitrobenzene	"	"	"		10.0	ND	"	
2-Nitrophenol	"	"	"		5.00	ND	"	
4-Nitrophenol	"	"	"		10.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		10.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		10.0	ND	"	
Pentachlorophenol	"	"	"		10.0	ND	"	
Phenanthrene	"	"	"		10.0	ND	"	
Phenol	"	"	"		10.0	ND	"	
Pyrene	"	"	"		5.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		5.00	ND	"	
2,4,5-Trichlorophenol	"	"	"		10.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		10.0	ND	"	
Surrogate: 2-FP	"	"	"	40.0-115		58.6	%	
Surrogate: Phenol-d6	"	"	"	18.0-145		67.9	"	
Surrogate: 2,4,6-TBP	"	"	"	24.0-130		84.5	"	
Surrogate: Nitrobenzene-d5	"	"	"	42.0-110		74.4	"	
Surrogate: 2-FBP	"	"	"	46.0-116		84.2	"	
Surrogate: p-Terphenyl-d14	"	"	"	63.0-117		86.8	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 29 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01				B809089-04			Water	
Acenaphthene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Acenaphthylene	"	"	"		10.0	ND	"	
Aniline	"	"	"		10.0	ND	"	
Anthracene	"	"	"		10.0	ND	"	
Benzoic Acid	"	"	"		20.0	ND	"	
Benzo (a) anthracene	"	"	"		5.00	ND	"	
Benzo (b) fluoranthene	"	"	"		5.00	ND	"	
Benzo (k) fluoranthene	"	"	"		5.00	ND	"	
Benzo (ghi) perylene	"	"	"		5.00	ND	"	
Benzo (a) pyrene	"	"	"		5.00	ND	"	
Benzyl alcohol	"	"	"		10.0	ND	"	
Bis(2-chloroethoxy)methane	"	"	"		10.0	ND	"	
Bis(2-chloroethyl)ether	"	"	"		10.0	ND	"	
Bis(2-chloroisopropyl)ether	"	"	"		10.0	ND	"	
Bis(2-ethylhexyl)phthalate	"	"	"		20.0	ND	"	
4-Bromophenyl phenyl ether	"	"	"		10.0	ND	"	
Butyl benzyl phthalate	"	"	"		5.00	ND	"	
Carbazole	"	"	"		10.0	ND	"	
4-Chloroaniline	"	"	"		5.00	ND	"	
2-Chloronaphthalene	"	"	"		10.0	ND	"	
4-Chloro-3-methylphenol	"	"	"		10.0	ND	"	
2-Chlorophenol	"	"	"		10.0	ND	"	
4-Chlorophenyl phenyl ether	"	"	"		10.0	ND	"	
Chrysene	"	"	"		5.00	ND	"	
Dibenz (a,h) anthracene	"	"	"		5.00	ND	"	
Dibenzofuran	"	"	"		10.0	ND	"	
Di-n-butyl phthalate	"	"	"		5.00	ND	"	
1,3-Dichlorobenzene	"	"	"		5.00	ND	"	
1,4-Dichlorobenzene	"	"	"		5.00	ND	"	
1,2-Dichlorobenzene	"	"	"		5.00	ND	"	
3,3'-Dichlorobenzidine	"	"	"		20.0	ND	"	
2,4-Dichlorophenol	"	"	"		10.0	ND	"	
Diethyl phthalate	"	"	"		10.0	ND	"	
2,4-Dimethylphenol	"	"	"		10.0	ND	"	
Dimethyl phthalate	"	"	"		10.0	ND	"	
4,6-Dinitro-2-methylphenol	"	"	"		10.0	ND	"	
2,4-Dinitrophenol	"	"	"		10.0	ND	"	
2,4-Dinitrotoluene	"	"	"		10.0	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 30 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
090198-BIL-MW5-GW-01 (continued)				B809089-04		Water		
2,6-Dinitrotoluene	0980182	9/5/98	9/14/98		10.0	ND	ug/l	
Di-n-octyl phthalate	"	"	"		5.00	ND	"	
Fluoranthene	"	"	"		5.00	ND	"	
Fluorene	"	"	"		10.0	ND	"	
Hexachlorobenzene	"	"	"		10.0	ND	"	
Hexachlorobutadiene	"	"	"		5.00	ND	"	
Hexachlorocyclopentadiene	"	"	"		5.00	ND	"	
Hexachloroethane	"	"	"		10.0	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		5.00	ND	"	
Isophorone	"	"	"		10.0	ND	"	
2-Methylnaphthalene	"	"	"		10.0	ND	"	
2-Methylphenol	"	"	"		10.0	ND	"	
3 & 4-Methylphenol	"	"	"		10.0	ND	"	
naphthalene	"	"	"		10.0	ND	"	
2-Nitroaniline	"	"	"		20.0	ND	"	
3-Nitroaniline	"	"	"		10.0	ND	"	
4-Nitroaniline	"	"	"		10.0	ND	"	
Nitrobenzene	"	"	"		10.0	ND	"	
2-Nitrophenol	"	"	"		5.00	ND	"	
4-Nitrophenol	"	"	"		10.0	ND	"	
N-Nitrosodiphenylamine	"	"	"		10.0	ND	"	
N-Nitrosodi-n-propylamine	"	"	"		10.0	ND	"	
Pentachlorophenol	"	"	"		10.0	ND	"	
Phenanthrene	"	"	"		10.0	ND	"	
Phenol	"	"	"		10.0	ND	"	
Pyrene	"	"	"		5.00	ND	"	
1,2,4-Trichlorobenzene	"	"	"		5.00	ND	"	
2,4,5-Trichlorophenol	"	"	"		10.0	ND	"	
2,4,6-Trichlorophenol	"	"	"		10.0	ND	"	
Surrogate: 2-FP	"	"	"	40.0-115		54.7	%	
Surrogate: Phenol-d6	"	"	"	18.0-145		62.5	"	
Surrogate: 2,4,6-TBP	"	"	"	24.0-130		89.0	"	
Surrogate: Nitrobenzene-d5	"	"	"	42.0-110		59.5	"	
Surrogate: 2-FBP	"	"	"	46.0-116		71.0	"	
Surrogate: p-Terphenyl-d14	"	"	"	63.0-117		86.2	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 31 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9211

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Conventional Chemistry Parameters by APHA/EPA Methods North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
<u>090198-BIL-MW3-GW-01</u> Cyanide (total)	0980401	9/10/98	9/10/98	<u>B809089-01</u> EPA 335.2	0.0100	ND	<u>Water</u> mg/l	
<u>090198-BIL-MW4-GW-01</u> Cyanide (total)	0980401	9/10/98	9/10/98	<u>B809089-02</u> EPA 335.2	0.0100	ND	<u>Water</u> mg/l	
<u>090298-BIL-MW2-GW-01</u> Cyanide (total)	0980401	9/10/98	9/10/98	<u>B809089-03</u> EPA 335.2	0.0100	ND	<u>Water</u> mg/l	
<u>090198-BIL-MW5-GW-01</u> Cyanide (total)	0980401	9/10/98	9/10/98	<u>B809089-04</u> EPA 335.2	0.0100	ND	<u>Water</u> mg/l	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 32 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Hydrocarbon Identification by Washington DOE Method NWTPH-HCID/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980181		Date Prepared: 9/5/98		Extraction Method: EPA 3520C/600 Series						
Blank		0980181-BLK1								
Gx Range Hydrocarbons	9/8/98		ND	mg/l		0.250				
Kerosene Range Hydrocarbons	"		ND	"		0.630				
Diesel Range Hydrocarbons	"		ND	"		0.630				
Insulating Oil Range Hydrocarbons	"		ND	"		0.630				
Heavy Fuel Oil Range Hydrocarbons	"		ND	"		0.630				
Lube Oil Range Hydrocarbons	"		ND	"		0.630				
Surrogate: 2-FBP	"	DET	DET	"		50.0-150	83.9			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Petroleum Products by NWTPH-Gx/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980148										
Blank										
Date Prepared: 9/4/98										
Extraction Method: EPA 5030B (P/T)										
Gasoline Range Hydrocarbons	9/4/98			ND	ug/l	50.0				
Surrogate: 4-BFB (FID)	"	48.0		60.3	"	50.0-150	126			
LCS										
0980148-BS1										
Gasoline Range Hydrocarbons	9/4/98	500		526	ug/l	70.0-130	105			
Surrogate: 4-BFB (FID)	"	48.0		71.7	"	50.0-150	149			
Duplicate										
0980148-DUP1 B809091-03										
Gasoline Range Hydrocarbons	9/4/98		ND	ND	ug/l				25.0	
Surrogate: 4-BFB (FID)	"	48.0		60.6	"	50.0-150	126			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up)/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980181										
Blank										
Date Prepared: 9/5/98										
0980181-BLK1										
Extraction Method: EPA 3520C/600 Series										
Diesel Range Hydrocarbons	9/8/98			ND	mg/l	0.250				
Lube Oil Range Hydrocarbons	"			ND	"	0.500				
Surrogate: 2-FBP	"	0.329		0.276	"	50.0-150	83.9			
LCS										
0980181-BS1										
Diesel Range Hydrocarbons	9/8/98	2.00		2.04	mg/l	60.0-140	102			
Surrogate: 2-FBP	"	0.329		0.302	"	50.0-150	91.8			
LCS Dup										
0980181-BSD1										
Diesel Range Hydrocarbons	9/8/98	2.00		1.63	mg/l	60.0-140	81.5	40.0	22.3	
Surrogate: 2-FBP	"	0.329		0.249	"	50.0-150	75.7			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 35 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recev. Limits	Recev. %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-------	----------------------------------	----------	-----------	-------	--------

Batch: 0980333

Date Prepared: 9/10/98

Extraction Method: EPA 3020A

Blank

0980333-BLK1

Antimony	9/11/98			ND	mg/l	0.00100				
Arsenic	"			ND	"	0.00100				
Barium	"			ND	"	0.0100				
Beryllium	"			ND	"	0.00100				
Cadmium	"			ND	"	0.00100				
Chromium	"			ND	"	0.00100				
Cobalt	"			ND	"	0.00100				
Copper	"			ND	"	0.00100				
Lead	"			ND	"	0.00100				
Manganese	"			ND	"	0.00100				
Nickel	"			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	"			ND	"	0.00100				
Thallium	"			ND	"	0.00100				
Vanadium	"			ND	"	0.00100				
Zinc	"			ND	"	0.0100				

LCS

0980333-BS1

Antimony	9/11/98	0.200		0.194	mg/l	80.0-120	97.0			
Arsenic	"	0.200		0.198	"	80.0-120	99.0			
Barium	"	0.200		0.202	"	80.0-120	101			
Beryllium	"	0.200		0.203	"	80.0-120	101			
Cadmium	"	0.200		0.194	"	80.0-120	97.0			
Chromium	"	0.200		0.192	"	80.0-120	96.0			
Cobalt	"	0.200		0.198	"	80.0-120	99.0			
Copper	"	0.200		0.199	"	80.0-120	99.5			
Lead	"	0.200		0.200	"	80.0-120	100			
Manganese	"	0.200		0.201	"	80.0-120	101			
Nickel	"	0.200		0.187	"	80.0-120	93.5			
Selenium	"	0.200		0.196	"	80.0-120	98.0			
Silver	"	0.200		0.191	"	80.0-120	95.5			
Thallium	"	0.200		0.203	"	80.0-120	101			
Vanadium	"	0.200		0.197	"	80.0-120	98.5			
Zinc	"	0.200		0.194	"	80.0-120	97.0			

Duplicate

0980333-DUP1

B809089-01

Antimony	9/11/98		ND	ND	mg/l			20.0		
----------	---------	--	----	----	------	--	--	------	--	--

North Creek Analytical - Bothell

*Refer to end of report for text of notes and defin.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recovery Limits	Recovery %	RPD Limit	RPD %	Notes*
Duplicate (continued)										
	0980333-DUP1		B809089-01							
Arsenic	9/11/98		ND	ND	mg/l			20.0		
Barium	"		0.0233	0.0259	"			20.0	10.6	
Beryllium	"		ND	ND	"			20.0		
Cadmium	"		ND	ND	"			20.0		
Chromium	"		0.00111	0.00112	"			20.0	0.897	
Cobalt	"		ND	ND	"			20.0		
Copper	"		0.00185	0.00195	"			20.0	5.26	
Lead	"		ND	0.00104	"			20.0		2
Manganese	"		0.348	0.358	"			20.0	2.83	
Nickel	"		0.00247	0.00255	"			20.0	3.19	
Selenium	"		ND	ND	"			20.0		
Silver	"		ND	ND	"			20.0		
Thallium	"		ND	ND	"			20.0		
Vanadium	"		ND	ND	"			20.0		
Zinc	"		ND	ND	"			20.0		

Matrix Spike										
	0980333-MS1		B809089-01							
Antimony	9/11/98	0.200	ND	0.189	mg/l	75.0-125		94.5		
Arsenic	"	0.200	ND	0.197	"	75.0-125		98.5		
Barium	"	0.200	0.0233	0.218	"	75.0-125		97.3		
Beryllium	"	0.200	ND	0.192	"	75.0-125		96.0		
Cadmium	"	0.200	ND	0.189	"	75.0-125		94.5		
Chromium	"	0.200	0.00111	0.177	"	75.0-125		87.9		
Cobalt	"	0.200	ND	0.181	"	75.0-125		90.5		
Copper	"	0.200	0.00185	0.194	"	75.0-125		96.1		
Lead	"	0.200	ND	0.197	"	75.0-125		98.5		
Manganese	9/12/98	0.200	0.348	0.550	"	75.0-125		101		
Nickel	9/11/98	0.200	0.00247	0.169	"	75.0-125		83.3		
Selenium	"	0.200	ND	0.192	"	75.0-125		96.0		
Silver	"	0.200	ND	0.179	"	75.0-125		89.5		
Thallium	"	0.200	ND	0.201	"	75.0-125		101		
Vanadium	"	0.200	ND	0.187	"	75.0-125		93.5		
Zinc	"	0.200	ND	0.192	"	75.0-125		96.0		

Batch: 0980414

Date Prepared: 9/14/98

Extraction Method: EPA 3020A

Blank

0980414-BLK1

Mercury

9/15/98

ND

mg/l

0.00100

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 37 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS	0980414-BS1									
Mercury	9/15/98	0.00500		0.00513	mg/l	70.0-130	103			
Matrix Spike	0980414-MS1		B809089-02							
Mercury	9/15/98	0.00500	ND	0.00541	mg/l	75.0-125	108			
Matrix Spike Dup	0980414-MSD1		B809089-02							
Mercury	9/15/98	0.00500	ND	0.00537	mg/l	75.0-125	107	20.0	0.930	
Batch: 0980533	Date Prepared: 9/23/98					Extraction Method: EPA 3020A				
Blank	0980533-BLK1									
Aluminum	9/24/98			ND	mg/l	0.0500				
LCS	0980533-BS1									
Aluminum	9/25/98	1.00		1.18	mg/l	80.0-120	118			
Duplicate	0980533-DUP1		B809089-01							
Aluminum	9/24/98		0.107	0.112	mg/l			20.0	4.57	
Matrix Spike	0980533-MS1		B809089-01							
Aluminum	9/24/98	1.00	0.107	1.16	mg/l	75.0-125	105			
Batch: 0980557	Date Prepared: 9/17/98					Extraction Method: EPA 3010A				
Blank	0980557-BLK1									
Calcium	9/22/98			0.446	mg/l	0.250				3
Iron	"			ND	"	0.150				
Magnesium	"			ND	"	0.100				
Potassium	"			ND	"	0.200				
Sodium	"			ND	"	0.500				
LCS	0980557-BS1									
Calcium	9/22/98	1.00		1.29	mg/l	80.0-120	129			3.6
Iron	"	1.00		1.01	"	80.0-120	101			
Magnesium	"	1.00		0.896	"	80.0-120	89.6			
Potassium	"	10.0		9.50	"	80.0-120	95.0			
Sodium	"	1.00		0.990	"	80.0-120	99.0			
Matrix Spike	0980557-MS1		B809089-04							
Calcium	9/22/98	1.00	72.9	73.8	mg/l	80.0-120	90.0			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 38 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Total Metals by EPA 6000/7000 Series Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>Matrix Spike (continued)</u>										
	<u>0980557-MS1</u>		<u>B809089-04</u>							
Iron	9/22/98	1.00	8.88	10.1	mg/l	80.0-120	122			4
Magnesium	"	1.00	16.7	17.9	"	80.0-120	120			
Potassium	"	10.0	4.91	14.2	"	80.0-120	92.9			
Sodium	"	1.00	10.3	11.3	"	80.0-120	100			
<u>Matrix Spike Dup</u>										
	<u>0980557-MSD1</u>		<u>B809089-04</u>							
Calcium	9/22/98	1.00	72.9	72.5	mg/l	80.0-120	NR	20.0	NR	4
Iron	"	1.00	8.88	10.1	"	80.0-120	122	20.0	0	4
Magnesium	"	1.00	16.7	17.7	"	80.0-120	100	20.0	18.2	
Potassium	"	10.0	4.91	14.3	"	80.0-120	93.9	20.0	1.07	
Sodium	"	1.00	10.3	11.2	"	80.0-120	90.0	20.0	10.5	



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recev. Limits	Recev. %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-------	----------------------------------	-------------	--------------	----------	--------

Batch: 0980180

Date Prepared: 9/5/98

Extraction Method: EPA 3520C/600 Series

Blank

0980180-BLK1

Aldrin	9/24/98		ND	ug/l	0.0400					
alpha-BHC	"		ND	"	0.0200					
beta-BHC	"		ND	"	0.0300					
delta-BHC	"		ND	"	0.0200					
gamma-BHC (Lindane)	"		ND	"	0.0300					
Chlordane (tech)	"		ND	"	0.150					
alpha-Chlordane	"		ND	"	0.0200					
gamma-Chlordane	"		ND	"	0.0200					
4,4'-DDD	"		ND	"	0.0400					
4,4'-DDE	"		ND	"	0.0300					
4,4'-DDT	"		ND	"	0.0900					
Dieldrin	"		ND	"	0.0700					
Endosulfan I	"		ND	"	0.0300					
Endosulfan II	"		ND	"	0.0500					
Endosulfan sulfate	"		ND	"	0.0700					
Endrin	"		ND	"	0.0800					
Endrin aldehyde	"		ND	"	0.0800					
Heptachlor	"		ND	"	0.0300					
Heptachlor epoxide	"		ND	"	0.0300					
Methoxychlor	"		ND	"	0.500					
Toxaphene	"		ND	"	1.50					
Aroclor 1016	"		ND	"	0.100					
Aroclor 1221	"		ND	"	0.100					
Aroclor 1232	"		ND	"	0.100					
Aroclor 1242	"		ND	"	0.100					
Aroclor 1248	"		ND	"	0.100					
Aroclor 1254	"		ND	"	0.100					
Aroclor 1260	"		ND	"	0.100					
Aroclor 1262	"		ND	"	0.100					
Aroclor 1268	"		ND	"	0.100					
Surrogate: TCN	"	0.200	0.161	"	40.0-130	80.5				

LCS

0980180-BS1

Aldrin	9/24/98	0.250	0.235	ug/l	45.0-143	94.0				
gamma-BHC (Lindane)	"	0.250	0.202	"	45.0-147	80.8				
Heptachlor	"	0.250	0.108	"	37.0-156	43.2				
Aroclor 1260	"	10.0	6.25	"	33.0-122	62.5				

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18339 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Organochlorine Pesticides and PCBs by EPA Method 8081A and 8082/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>LCS (continued)</u>										
<u>0980180-BS1</u>										
Surrogate: TCX	9/24/98	0.200		0.161	ug/l	40.0-130	80.5			
<u>LCS Dup</u>										
<u>0980180-BSD1</u>										
Aldrin	9/24/98	0.250		0.248	ug/l	45.0-143	99.2	36.0	5.38	
gamma-BHC (Lindane)	"	0.250		0.214	"	45.0-147	85.6	25.0	5.77	
Heptachlor	"	0.250		0.118	"	37.0-156	47.2	37.0	8.85	
Aroclor 1260	"	10.0		6.74	"	33.0-122	67.4	21.0	7.54	
Surrogate: TCX	"	0.200		0.165	"	40.0-130	82.5			
<u>Matrix Spike</u>										
<u>0980180-MS1</u> <u>B809108-03</u>										
Aldrin	9/24/98	0.472	ND	0.111	ug/l	45.0-143	23.5			5
gamma-BHC (Lindane)	"	0.472	ND	0.440	"	45.0-147	93.2			
Heptachlor	"	0.472	ND	0.191	"	37.0-156	40.5			
Aroclor 1260	"	18.9	ND	14.5	"	33.0-122	76.7			
Surrogate: TCX	"	0.377		0.317	"	40.0-130	84.1			
<u>Matrix Spike Dup</u>										
<u>0980180-MSD1</u> <u>B809108-03</u>										
Aldrin	9/24/98	0.472	ND	0.184	ug/l	45.0-143	39.0	36.0	49.6	5
gamma-BHC (Lindane)	"	0.472	ND	0.424	"	45.0-147	89.8	25.0	3.72	
Heptachlor	"	0.472	ND	0.165	"	37.0-156	35.0	37.0	14.6	5
Aroclor 1260	"	18.9	ND	14.1	"	33.0-122	74.6	21.0	2.78	
Surrogate: TCX	"	0.377		0.335	"	40.0-130	88.9			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9211

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Chlorinated Herbicides by EPA Method 8151A/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
---------	---------------	-------------	---------------	-----------	-------	----------------------------------	-------------	--------------	----------	--------

Batch: 0980213

Date Prepared: 9/8/98

Extraction Method: EPA 1658

Blank

0980213-BLK1

2,4-D	9/21/98			ND	ug/l	0.500				
2,4-DB	"			ND	"	1.00				
2,4,5-T	"			ND	"	1.00				
2,4,5-TP (Silvex)	"			ND	"	1.00				
Dalapon	"			ND	"	1.50				
Dicamba	"			ND	"	0.500				
Dichlorprop	"			ND	"	1.00				
Dinoseb	"			ND	"	1.00				
MCPA	"			ND	"	50.0				
MCPP	"			ND	"	50.0				
Surrogate: 2,4-DCAA	"	11.1		3.40	"	24.0-135	30.6			

LCS

0980213-BS1

2,4-D	9/21/98	3.33		2.59	ug/l	34.0-136	77.8			
2,4,5-TP (Silvex)	"	3.33		2.54	"	34.0-123	76.3			
Surrogate: 2,4-DCAA	"	11.1		3.37	"	24.0-135	30.4			

Matrix Spike

0980213-MS1

B809089-03

2,4-D	9/21/98	6.67	ND	5.24	ug/l	34.0-136	78.6			
2,4,5-TP (Silvex)	"	6.67	ND	5.28	"	34.0-123	79.2			
Surrogate: 2,4-DCAA	"	22.2		14.3	"	24.0-135	64.4			

Matrix Spike Dup

0980213-MSD1

B809089-03

2,4-D	9/21/98	6.67	ND	4.97	ug/l	34.0-136	74.5	46.0	5.36	
2,4,5-TP (Silvex)	"	6.67	ND	5.50	"	34.0-123	82.5	41.0	4.08	
Surrogate: 2,4-DCAA	"	22.2		16.4	"	24.0-135	73.9			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980188		Date Prepared: 9/5/98			Extraction Method: EPA 5030B [P/T]					
Blank	0980188-BLK1									
Acetone	9/5/98			ND	ug/l	10.0				
Benzene	"			ND	"	1.00				
Bromobenzene	"			ND	"	1.00				
Bromochloromethane	"			ND	"	1.00				
Bromodichloromethane	"			ND	"	1.00				
Bromoform	"			ND	"	1.00				
Bromomethane	"			ND	"	1.00				
2-Butanone	"			ND	"	10.0				
n-Butylbenzene	"			ND	"	1.00				
sec-Butylbenzene	"			ND	"	1.00				
tert-Butylbenzene	"			ND	"	1.00				
Carbon disulfide	"			ND	"	1.00				
Carbon tetrachloride	"			ND	"	1.00				
Chlorobenzene	"			ND	"	1.00				
Chloroethane	"			ND	"	1.00				
Chloroform	"			ND	"	1.00				
Chloromethane	"			ND	"	5.00				
2-Chlorotoluene	"			ND	"	1.00				
4-Chlorotoluene	"			ND	"	1.00				
Dibromochloromethane	"			ND	"	1.00				
1,2-Dibromo-3-chloropropane	"			ND	"	5.00				
1,2-Dibromoethane	"			ND	"	1.00				
Dibromomethane	"			ND	"	1.00				
1,2-Dichlorobenzene	"			ND	"	1.00				
1,3-Dichlorobenzene	"			ND	"	1.00				
1,4-Dichlorobenzene	"			ND	"	1.00				
Dichlorodifluoromethane	"			ND	"	1.00				
1,1-Dichloroethane	"			ND	"	1.00				
1,2-Dichloroethane	"			ND	"	1.00				
1,1-Dichloroethene	"			ND	"	1.00				
cis-1,2-Dichloroethene	"			ND	"	1.00				
trans-1,2-Dichloroethene	"			ND	"	1.00				
1,2-Dichloropropane	"			ND	"	1.00				
1,3-Dichloropropane	"			ND	"	1.00				
2,2-Dichloropropane	"			ND	"	1.00				
1,1-Dichloropropene	"			ND	"	1.00				
cis-1,3-Dichloropropene	"			ND	"	1.00				

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

16939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 43 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Blank (continued)										
0980188-BLK1										
trans-1,3-Dichloropropene	9/5/98			ND	ug/l	1.00				
Ethylbenzene	"			ND	"	1.00				
Hexachlorobutadiene	"			ND	"	1.00				
2-Hexanone	"			ND	"	10.0				
Isopropylbenzene	"			ND	"	1.00				
p-Isopropyltoluene	"			ND	"	1.00				
Methylene chloride	"			5.07	"	5.00				1
4-Methyl-2-pentanone	"			ND	"	10.0				
Naphthalene	"			ND	"	1.00				
n-Propylbenzene	"			ND	"	1.00				
Styrene	"			ND	"	1.00				
1,1,1,2-Tetrachloroethane	"			ND	"	1.00				
1,1,2,2-Tetrachloroethane	"			ND	"	1.00				
Tetrachloroethene	"			ND	"	1.00				
Toluene	"			ND	"	1.00				
1,2,3-Trichlorobenzene	"			ND	"	1.00				
1,2,4-Trichlorobenzene	"			ND	"	1.00				
1,1,1-Trichloroethane	"			ND	"	1.00				
1,1,2-Trichloroethane	"			ND	"	1.00				
Trichloroethene	"			ND	"	1.00				
Trichlorofluoromethane	"			ND	"	1.00				
1,2,3-Trichloropropane	"			ND	"	1.00				
1,2,4-Trimethylbenzene	"			ND	"	1.00				
1,3,5-Trimethylbenzene	"			ND	"	1.00				
Vinyl chloride	"			ND	"	1.00				
m,p-Xylene	"			ND	"	2.00				
o-Xylene	"			ND	"	1.00				
Surrogate: 2-Bromopropene	"	20.0		20.1	"	80.0-120	101			
Surrogate: 1,2-DCA-d4	"	20.0		23.1	"	80.0-120	116			
Surrogate: Toluene-d8	"	20.0		19.0	"	80.0-120	95.0			
Surrogate: 4-BFB	"	20.0		19.7	"	80.0-120	98.5			
LCS										
0980188-BS1										
Benzene	9/5/98	10.0		8.19	ug/l	80.0-120	81.9			
Chlorobenzene	"	10.0		8.70	"	80.0-120	87.0			
1,1-Dichloroethene	"	10.0		8.09	"	80.0-120	80.9			
Toluene	"	10.0		10.3	"	80.0-120	103			
Trichloroethene	"	10.0		8.59	"	80.0-120	85.9			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 44 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Volatile Organic Compounds by EPA Method 8260B/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>LCS (continued)</u>		<u>0980188-BS1</u>								
Surrogate: 2-Bromopropene	9/5/98	20.0		19.3	ug/l	80.0-120	96.5			
Surrogate: 1,2-DCA-d4	"	20.0		22.1	"	80.0-120	111			
Surrogate: Toluene-d8	"	20.0		19.0	"	80.0-120	95.0			
Surrogate: 4-BFB	"	20.0		19.5	"	80.0-120	97.5			
<u>Matrix Spike</u>		<u>0980188-MS1</u> <u>B809089-01</u>								
Benzene	9/5/98	10.0	ND	8.10	ug/l	80.0-120	81.0			
Chlorobenzene	"	10.0	ND	8.60	"	80.0-120	86.0			
1,1-Dichloroethene	"	10.0	ND	7.43	"	80.0-120	74.3			5
Toluene	"	10.0	ND	8.71	"	80.0-120	87.1			
Trichloroethene	"	10.0	ND	8.46	"	80.0-120	84.6			
Surrogate: 2-Bromopropene	"	20.0		18.7	"	80.0-120	93.5			
Surrogate: 1,2-DCA-d4	"	20.0		21.7	"	80.0-120	109			
Surrogate: Toluene-d8	"	20.0		19.0	"	80.0-120	95.0			
Surrogate: 4-BFB	"	20.0		19.9	"	80.0-120	99.5			
<u>Matrix Spike Dup</u>		<u>0980188-MSD1</u> <u>B809089-01</u>								
Benzene	9/5/98	10.0	ND	7.98	ug/l	80.0-120	79.8	15.0	1.49	5
Chlorobenzene	"	10.0	ND	8.57	"	80.0-120	85.7	15.0	0.349	
1,1-Dichloroethene	"	10.0	ND	7.28	"	80.0-120	72.8	15.0	2.04	5
Toluene	"	10.0	ND	9.89	"	80.0-120	98.9	15.0	12.7	
Trichloroethene	"	10.0	ND	8.58	"	80.0-120	85.8	15.0	1.41	
Surrogate: 2-Bromopropene	"	20.0		19.1	"	80.0-120	95.5			
Surrogate: 1,2-DCA-d4	"	20.0		21.6	"	80.0-120	108			
Surrogate: Toluene-d8	"	20.0		19.0	"	80.0-120	95.0			
Surrogate: 4-BFB	"	20.0		19.5	"	80.0-120	97.5			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980182		Date Prepared: 9/5/98		Extraction Method: EPA 3520C/600 Series					
Blank		0980182-BLK1							
Acenaphthene	9/13/98			ND	ug/l	10.0			
Acenaphthylene	"			ND	"	10.0			
Aniline	"			ND	"	10.0			
Anthracene	"			ND	"	10.0			
Benzoic Acid	"			ND	"	20.0			
Benzo (a) anthracene	"			ND	"	5.00			
Benzo (b) fluoranthene	"			ND	"	5.00			
Benzo (k) fluoranthene	"			ND	"	5.00			
Benzo (ghi) perylene	"			ND	"	5.00			
Benzo (a) pyrene	"			ND	"	5.00			
Benzyl alcohol	"			ND	"	10.0			
Bis(2-chloroethoxy)methane	"			ND	"	10.0			
Bis(2-chloroethyl)ether	"			ND	"	10.0			
Bis(2-chloroisopropyl)ether	"			ND	"	10.0			
Bis(2-ethylhexyl)phthalate	"			ND	"	20.0			
4-Bromophenyl phenyl ether	"			ND	"	10.0			
Butyl benzyl phthalate	"			ND	"	5.00			
Carbazole	"			ND	"	10.0			
4-Chloroaniline	"			ND	"	5.00			
2-Chloronaphthalene	"			ND	"	10.0			
4-Chloro-3-methylphenol	"			ND	"	10.0			
2-Chlorophenol	"			ND	"	10.0			
4-Chlorophenyl phenyl ether	"			ND	"	10.0			
Chrysene	"			ND	"	5.00			
Dibenz (a,h) anthracene	"			ND	"	5.00			
Dibenzofuran	"			ND	"	10.0			
Di-n-butyl phthalate	"			ND	"	5.00			
1,3-Dichlorobenzene	"			ND	"	5.00			
1,4-Dichlorobenzene	"			ND	"	5.00			
1,2-Dichlorobenzene	"			ND	"	5.00			
3,3'-Dichlorobenzidine	"			ND	"	20.0			
2,4-Dichlorophenol	"			ND	"	10.0			
Diethyl phthalate	"			ND	"	10.0			
2,4-Dimethylphenol	"			ND	"	10.0			
Dimethyl phthalate	"			ND	"	10.0			
4,6-Dinitro-2-methylphenol	"			ND	"	10.0			
2,4-Dinitrophenol	"			ND	"	10.0			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 46 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Blank (continued)	0980182-BLK1									
2,4-Dinitrotoluene	9/13/98			ND	ug/l	10.0				
2,6-Dinitrotoluene	"			ND	"	10.0				
Di-n-octyl phthalate	"			ND	"	5.00				
Fluoranthene	"			ND	"	5.00				
Fluorene	"			ND	"	10.0				
Hexachlorobenzene	"			ND	"	10.0				
Hexachlorobutadiene	"			ND	"	5.00				
Hexachlorocyclopentadiene	"			ND	"	5.00				
Hexachloroethane	"			ND	"	10.0				
Indeno (1,2,3-cd) pyrene	"			ND	"	5.00				
Isophorone	"			ND	"	10.0				
2-Methylnaphthalene	"			ND	"	10.0				
2-Methylphenol	"			ND	"	10.0				
& 4-Methylphenol	"			ND	"	10.0				
Naphthalene	"			ND	"	10.0				
2-Nitroaniline	"			ND	"	20.0				
3-Nitroaniline	"			ND	"	10.0				
4-Nitroaniline	"			ND	"	10.0				
Nitrobenzene	"			ND	"	10.0				
2-Nitrophenol	"			ND	"	5.00				
4-Nitrophenol	"			ND	"	10.0				
N-Nitrosodiphenylamine	"			ND	"	10.0				
N-Nitrosodi-n-propylamine	"			ND	"	10.0				
Pentachlorophenol	"			ND	"	10.0				
Phenanthrene	"			ND	"	10.0				
Phenol	"			ND	"	10.0				
Pyrene	"			ND	"	5.00				
1,2,4-Trichlorobenzene	"			ND	"	5.00				
2,4,5-Trichlorophenol	"			ND	"	10.0				
2,4,6-Trichlorophenol	"			ND	"	10.0				
Surrogate: 2-FP	"	50.0		32.5	"	40.0-115	65.0			
Surrogate: Phenol-d6	"	50.0		37.9	"	18.0-145	75.8			
Surrogate: 2,4,6-TBP	"	50.0		38.9	"	24.0-130	77.8			
Surrogate: Nitrobenzene-d5	"	50.0		40.9	"	42.0-110	81.8			
Surrogate: 2-FBP	"	50.0		46.8	"	46.0-116	93.6			
Surrogate: p-Terphenyl-d14	"	50.0		47.1	"	63.0-117	94.2			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
Easi 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 47 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Tetra Tech, Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS										
0980182-BS1										
Acenaphthene	9/13/98	100		77.6	ug/l	42.0-110	77.6			
4-Chloro-3-methylphenol	"	200		150	"	35.0-110	75.0			
2-Chlorophenol	"	200		146	"	45.0-110	73.0			
1,4-Dichlorobenzene	"	100		83.0	"	23.0-110	83.0			
2,4-Dinitrotoluene	"	100		78.3	"	51.0-110	78.3			
4-Nitrophenol	"	200		138	"	16.0-110	69.0			
N-Nitrosodi-n-propylamine	"	100		77.3	"	34.0-115	77.3			
Pentachlorophenol	"	200		122	"	30.0-124	61.0			
Phenol	"	200		153	"	39.0-110	76.5			
Pyrene	"	100		83.7	"	49.0-113	83.7			
1,2,4-Trichlorobenzene	"	100		80.0	"	17.0-110	80.0			
Surrogate: 2-FP	"	50.0		33.8	"	40.0-115	67.6			
Surrogate: Phenol-d6	"	50.0		40.0	"	18.0-145	80.0			
Surrogate: 2,4,6-TBP	"	50.0		42.2	"	24.0-130	84.4			
Surrogate: Nitrobenzene-d5	"	50.0		38.1	"	42.0-110	76.2			
Surrogate: 2-FBP	"	50.0		44.9	"	46.0-116	89.8			
Surrogate: p-Terphenyl-d14	"	50.0		43.1	"	63.0-117	86.2			
Matrix Spike										
0980182-MS1 B809089-04										
Acenaphthene	9/14/98	235	ND	185	ug/l	48.0-110	78.7			
4-Chloro-3-methylphenol	"	471	ND	368	"	45.0-110	78.1			
2-Chlorophenol	"	471	ND	322	"	39.0-110	68.4			
1,4-Dichlorobenzene	"	235	ND	185	"	27.0-110	78.7			
2,4-Dinitrotoluene	"	235	ND	213	"	60.0-110	90.6			
4-Nitrophenol	"	471	ND	364	"	20.0-110	77.3			
N-Nitrosodi-n-propylamine	"	235	ND	189	"	23.0-116	80.4			
Pentachlorophenol	"	471	ND	331	"	39.0-129	70.3			
Phenol	"	471	ND	350	"	31.0-115	74.3			
Pyrene	"	235	ND	209	"	63.0-113	88.9			
1,2,4-Trichlorobenzene	"	235	ND	177	"	54.0-123	75.3			
Surrogate: 2-FP	"	118		69.4	"	40.0-115	58.8			
Surrogate: Phenol-d6	"	118		87.3	"	18.0-145	74.0			
Surrogate: 2,4,6-TBP	"	118		96.9	"	24.0-130	82.1			
Surrogate: Nitrobenzene-d5	"	118		82.7	"	42.0-110	70.1			
Surrogate: 2-FBP	"	118		101	"	46.0-116	85.6			
Surrogate: p-Terphenyl-d14	"	118		109	"	63.0-117	92.4			

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions

Joy B Chang, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East: 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

Page 48 of 51



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Semivolatile Organic Compounds by EPA Method 8270C/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recev. Limits	Recev. %	RPD Limit	RPD %	Notes*
Matrix Spike Dup		0980182-MSD1	B809089-04							
Acenaphthene	9/14/98	235	ND	167	ug/l	48.0-110	71.1	31.0	10.1	
4-Chloro-3-methylphenol	"	471	ND	338	"	45.0-110	71.8	30.0	8.41	
2-Chlorophenol	"	471	ND	265	"	39.0-110	56.3	38.0	19.4	
1,4-Dichlorobenzene	"	235	ND	152	"	27.0-110	64.7	42.0	19.5	
2,4-Dinitrotoluene	"	235	ND	182	"	60.0-110	77.4	28.0	15.7	
4-Nitrophenol	"	471	ND	341	"	20.0-110	72.4	33.0	6.55	
N-Nitrosodi-n-propylamine	"	235	ND	170	"	23.0-116	72.3	36.0	10.6	
Pentachlorophenol	"	471	ND	319	"	39.0-129	67.7	22.0	3.77	
Phenol	"	471	ND	286	"	31.0-115	60.7	38.0	20.1	
Pyrene	"	235	ND	201	"	63.0-113	85.5	18.0	3.90	
1,2,4-Trichlorobenzene	"	235	ND	147	"	54.0-123	62.6	29.0	18.4	
Surrogate: 2-FP	"	118		62.8	"	40.0-115	53.2			
Surrogate: Phenol-d6	"	118		76.4	"	18.0-145	64.7			
Surrogate: 2,4,6-TBP	"	118		97.6	"	24.0-130	82.7			
Surrogate: Nitrobenzene-d5	"	118		76.4	"	42.0-110	64.7			
Surrogate: 2-FBP	"	118		96.6	"	46.0-116	81.9			
Surrogate: p-Terphenyl-d14	"	118		111	"	63.0-117	94.1			



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech. Inc.	Project: Bradford Island Landfill	Sampled: 9/1/98 to 9/2/98
600 University St., Suite 800	Project Number: 10022-03	Received: 9/3/98
Seattle, WA 98101	Project Manager: Carlotta Cellucci	Reported: 9/28/98 17:46

Conventional Chemistry Parameters by APHA/EPA Methods/Quality Control North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980401										
Blank										
Cyanide (total)	9/10/98			ND	mg/l	0.00500				
LCS										
Cyanide (total)	9/10/98	0.0500		0.0473	mg/l	62.0-136	94.6			
Duplicate										
Cyanide (total)	9/10/98		ND	ND	mg/l			21.0		



NORTH CREEK ANALYTICAL

Environmental Laboratory Services

BOTHELL ■ (425) 420-9200 ■ FAX 420-9210
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 906-9200 ■ FAX 906-9210

Tetra Tech, Inc.
600 University St., Suite 800
Seattle, WA 98101

Project: Bradford Island Landfill
Project Number: 10022-03
Project Manager: Carlotta Cellucci

Sampled: 9/1/98 to 9/2/98
Received: 9/3/98
Reported: 9/28/98 17:46

Notes and Definitions

#	Note
1	Suspected laboratory contaminant.
2	Analyses are not controlled on RPD values from sample concentrations less than 10 times the reporting limit.
3	Background contamination found in the Method Blank. High spike recovery may be due to background contamination.
4	Analyses are not controlled on matrix spike RPD and/or percent recoveries when the sample concentration is significantly higher than the spike level.
5	The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference



DOCUMENT. _____

B809080

[illegible]

EMSL Analytical, Inc.

1001 SW Klickitat Way, Ste 107

Seattle, WA 98134

Phone: (206) 233-9007

Fax: (206) 233-9011

EMSL

Attn.: Carlotta Collucci
Tetra Tech, Inc.
600 University Street
Suite 800
Seattle, WA 98101

Wednesday, September 02, 1998

Ref Number: SE982526

POLARIZED LIGHT MICROSCOPY (PLM)

Performed by EPA 600/R-93/116 Method*

Project: Bradford Island Landfill

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	<u>ASBESTOS</u>		<u>NONASBESTOS</u>	
				%	TYPE	%	FIBROUS % NONFIBROUS
8-20-98-BIL- ASB-01		Black Fibrous Homogeneous	Teased/Dissolved	45%	Chrysotile	5%	Cellulose 50% Other
8-20-98-BIK- ASB-02 SILVER TOP COATING		Silver Non-Fibrous Layers # 2	Teased/Dissolved	None Detected		2%	Cellulose 98% Paint/Coating
8-20-98-BIK- ASB-02 ROOFING		Black Non-Fibrous Layers # 2	Teased/Dissolved	None Detected		5%	Cellulose 95% Other
8-20-98-BIK- ASB-03 CAB		Grey/Black Non-Fibrous Homogeneous	Teased/Crushed	22%	Chrysotile	3%	Cellulose 75% Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "% of Layers" refers to number of separable subsamples.

* NY samples also analyzed by ELAP 198-1 Method

Lisa Chen
Lisa Chen
Analyst

Lisa Chen
Approved
Signatory

Disclaimer: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. Samples reported as <1% or none detected should be tested with either SEM or TEM. The above test report relates only to the items tested. This report may only be reproduced in part with written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. All "NVLAP" reports with NVLAP logo must contain at least one signature to be valid. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

Analysis performed by EMSL Seattle (NVLAP Air and Bulk #200019)

APPENDIX I

DATA QUALITY EVALUATION REPORT

DATA QUALITY EVALUATION REPORT

Site Name: U.S. Army Corps of Engineers – Former Bradford Island
Landfill, Cascade Locks, Oregon

Laboratory: North Creek Analytical
Bothell, Washington

Contract Number: DACW57-96-D-0009

Task Order Number: 10

Quality Control Criteria Reviewed: Refer to Section 1.1

Report Date: 30 October 1998

1.0 INTRODUCTION

This report summarizes the evaluation of 14 soil samples, including one field quality assurance (QA) sample, and four groundwater samples, including one field QA sample collected during the assessment of the former Bradford Island Landfill, Cascade Locks, Oregon, on behalf of the U.S. Army Corps of Engineers, Portland District (CENWP). Soil samples were collected from 17 through 20 August 1998. Groundwater samples were collected between 01 and 02 September 1998. The project soil and groundwater samples were submitted to North Creek Analytical in Bothell, Washington, for laboratory analysis. The laboratory assigned two work orders for this project, including Work Order No. B808411 for soil samples and Work Order No. B809089 for groundwater samples. A laboratory batch number was assigned to soil and groundwater samples based on specified laboratory analyses. Table 1 identifies project soil and groundwater samples, including associated laboratory sample designation, field QA identification, and associated laboratory analyses with cross-referenced QA batch identification.

Data were reviewed and validated according to the U.S. Environmental Protection Agency (EPA) guidance document *U. S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994). The analytical data review was conducted in accordance with the specifications set forth in the final site inspection Work Plan (Tetra Tech 1998).

1.1 QUALITY CONTROL CRITERIA REVIEWED

The following quality control (QC) criteria were used for this data review and evaluation effort:

- Holding times
- Laboratory blank results
- Continuing calibrations
- Field blanks
- Field duplicate results
- Matrix spike/matrix spike duplicate results
- Laboratory duplicate and control sample results
- Surrogate recoveries
- Practical quantitation limits
- Overall assessment of data

1.2 DATA QUALIFIERS

The following data qualifiers are used in this data evaluation report. The definitions are consistent with EPA guidance document for data evaluation (EPA 1994):

- | | | |
|--------------|---|--|
| No qualifier | - | Indicates that the data are acceptable both qualitatively and quantitatively |
| U | - | Indicates compound was analyzed for but not detected above the concentration listed--the concentration listed is the sample quantitation limit. The laboratory uses "ND" instead |
| J | - | Indicates an estimated concentration--the result is considered qualitatively acceptable, but quantitatively unreliable |
| UJ | - | Indicates an estimated quantitation limit--the compound was analyzed for, but was considered non-detected |
| R | - | The data are unusable (compound may or may not be present)--resampling and reanalysis is required if verification is needed |

2.0 ANALYTICAL METHODS

Analytical methods and references for analyses are presented below and summarized on Table 1. The analysis of project samples collected during the former Bradford Island landfill site inspection was performed by North Creek Analytical of Bothell, Washington, a COE-validated laboratory that has

been approved by the U.S. Army Corps of Engineers - Missouri River Division. The chosen laboratory has performed analytical services for the U.S. EPA Contract Laboratory Program (CLP) and have established protocols and QA procedures that conform with EPA guidelines and Oregon State Department of Environmental Quality (DEQ) procedures. Routine analysis of solid and liquid environmental samples were performed using procedures based on the following EPA and State of Oregon methods:

- EPA Method 8260B - volatile organic compounds by gas chromatography/mass spectrometry (GC/MS) (EPA 1996).
- EPA Method 8270C - semi-volatile organic compounds by GC/MS (EPA 1996).
- EPA Method 8081A/8082 - organochlorine pesticides and polychlorinated biphenyls (PCBs) by gas chromatography/electron capture detection (GC/ECD) (EPA 1996).
- EPA Method 8151A - chlorinated herbicides by GC (EPA 1996)
- Northwest Total Petroleum Hydrocarbons: TPH Identification (NWTPH-HCID); Diesel Range Extended (NWTPH-Dx), and Gasoline Range (NWTPH-Gx) by gas chromatography/flame ionization detector (GC/FID) (DEQ 1996).
- EPA 6000 and 7000 series methods/metals by inductively coupled plasma and mass spectroscopy and mercury by cold vapor atomic absorption spectroscopy (EPA1996).
- EPA method 9010B - Total and amenable cyanide by distillation (EPA 1996)
- EPA Method Synthetic Precipitation Leaching Procedure Metals - Synthetic precipitate leaching procedure by Extraction Method 1312 and leachate analysis by appropriate EPA 6000 or 7000 series method (EPA 1996).

3.0 EVALUATION RESULTS

The following sections summarize the data evaluation results for project soil and groundwater samples collected during the assessment of the former Bradford Island Landfill, Cascade Locks, Oregon. The QC criteria identified in Section 1.1 are evaluated independently for each sample media (i.e., soil and groundwater).

3.1 SOILS (Work Order No. B808411)

Laboratory Work Order No. B808411 comprises 14 soil samples, including one field QA sample (refer to Table 1). The following section provides a summary of the QC criteria review for project soil samples.

3.1.1 Holding Times

All analyses were performed within the applicable method-specified maximum holding times (EPA 1996), with the exception of sample 8-17-98-BIL-SB1-01 which was analyzed 15 days after sample collection for volatile organic compounds by Method EPA 8260B (i.e., EPA method-specified maximum holding time = 14 days). Positive results for this sample are qualified as estimated (J) values. Non-detected compounds are also qualified as estimated (UJ) values based on the exceeded sample holding time.

3.1.2 Method Blanks

No target analytes were detected in associated laboratory method blank samples during the analyses of project soil samples, with the exception of the metal elements calcium and potassium in method blank sample 0980293-BLK1 at a concentration of 10.6 milligrams per kilogram (mg/kg) and 17.8 mg/kg, respectively. The concentrations of calcium and potassium detected in project soil samples is greater than 10 times the concentration detected in the associated method blank and therefore no qualification of the associated sample data is deemed necessary.

3.1.3 Field Blanks

No field blank samples were collected or analyzed in association with project soil samples. No qualification of data is required.

3.1.4 Continuing Calibration

Continuing calibrations for soil analyses were performed at the required frequencies and were within established acceptance criteria, with the following exceptions:

- **Total Petroleum Hydrocarbons--** The continuing calibration for diesel and lube oil range hydrocarbons in samples 8-19-98-BIL-TP1-SS-01, 8-19-98-BIL-TP2-SS-01, 8-20-98-BIL-TP6-SS-01, 8-20-98-BIL-TP9-SS-01, and associated blank sample 0880788-BK1 were performed slightly outside the required 12 hour calibration frequency (i.e., continuing calibration exceeded specified 12 frequency by approximately 45 minutes) due to an instrument stoppage. The continuing calibrations were within all other acceptance criteria and no qualification of the associated sample data is deemed necessary based on this review.
- **Organochlorine Pesticides and PCBs--** The continuing calibrations for the analysis of organochlorine pesticides and PCBs in soil (i.e., QA Batch No. 0880705) were outside established acceptance criteria for two compounds, including 4,4'-DDT and Methoxychlor. The responses for these compounds were below the lower calibration control limit indicating that positive results may exhibit a low bias. Two samples revealing detected concentrations of 4,4'-DDT, including samples 8-17-BIL-PW1-SB1-SS-01 and 8-19-98-BIL-TP1-SS-01 were reanalyzed (i.e., within method-specified holding time). Beginning calibrations were within acceptance criteria; however, the continuing calibration was again below the established control limits for these compounds and is the suspected results of matrix effects. The detection of 4,4'-DDT in samples 8-17-BIL-PW1-SB1-SS-01 and 8-19-98-BIL-TP1-SS-01 are qualified as estimated (J) values. All non-detected compounds are also qualified as estimated (UJ) values based on the potential for low bias.

- ***Semi-Volatile Compounds--*** The continuing calibrations for the analysis of semi-volatile compounds in soil (i.e., QA Batch No. 0880681) were within established acceptance criteria. However, several compounds in samples 8-20-98-BIL-TP5-SS-01 and 8-20-98-BIL-TP9-SS-01 (i.e., associated blind field duplicate) were flagged by the laboratory as estimated values due to matrix interference with the internal standard associated with the specified analytes. No additional qualification of the associated sample data is deemed necessary based on this review.

3.1.5 Matrix Spike/Matrix Spike Duplicate Results

The matrix spike/matrix spike duplicate (MS/MSD) results for project soil samples were found to be within the laboratory-specified percent recovery and relative percent difference (RPD) control limits, with the exception of the following:

- ***Volatile Organic Compounds--*** The percent recovery for 1,1-Dichloroethene was 67.8 percent was slightly below the associated lower matrix spike recovery control limit of 70 percent for QA Batch 0880906. The laboratory indicated that 1,1-Dichloroethene was diminished in the analytical spiking standard due to volatilization and that the recovery for this analyte does not represent an out-of-control condition for the sample batch. Based on review of associated batch QC results no qualification of the associated sample data is deemed necessary.
- ***Total Metals--*** Matrix spike recoveries were outside associated control limits for manganese (no recovery), antimony (low recovery), lead (low recovery), and zinc (high recovery) in QA Batch 098038. Matrix effects in spike sample 8-19-98-BIL-TP4-SS-01 are attributed to the relatively poor recovery of these compounds. No qualification of the associated sample data is deemed necessary based on review of these matrix spike recovery results.

No MS/MSD sample recovery was reported for aluminum, calcium, iron, magnesium, or sodium in QA Batch 0980557 due to the high concentrations of these metals in the spiked sample (i.e., sample 8-19-98-BIL-TP4-SS-01). No qualification to the associated sample data is deemed necessary based on this result.

No MS/MSD sample recovery was reported for mercury in QA Batch 0980054 due to the concentration of this metal in the spiked sample 8-20-98-BIL-TP8-SS-01. No qualification to the associated sample data is deemed necessary based on this result.

- **SPLP Leachate**-- The MS/MSD percent recovery for magnesium and MSD percent recovery for sodium were above the established control limits for QA Batch 098291. These results are attributed to matrix interference and sample concentrations which are higher than the spike level. No qualification of the associated sample data is deemed necessary based on these results.

3.1.6 Laboratory Duplicate and Control Sample Results

Laboratory duplicate results were within specified RPD limits and laboratory control sample (LCS) results were within laboratory-specified percent recovery limits for all soil analyses, with the exception of the following:

- **Total Metals**-- The RPDs for laboratory duplicate sample 098003-DUP1 were outside laboratory acceptance criteria for arsenic, barium, chromium, manganese, lead, vanadium, and zinc. The laboratory-specified RPD limits (i.e., ± 20 percent) for these metals were reportedly exceeded due to the nonhomogeneous nature of sample 8-19-98-BIL-TP4-SS-01. Accounting for the variability in the sample matrix a less restrictive RPD control limit of ± 40 percent has been applied for review purposes, as specified in the project Work Plan (Tetra Tech 1998). A single metal, arsenic, at 58.4 percent is observed outside the ± 40 percent control limit and associated sample results for arsenic are qualified as estimated (J) values.

The metal sodium was found slightly above the associated LCS percent recovery upper control limit for QA Batch 0980293 which indicates that positive results may exhibit a high bias for this element. Based on this result all positive detections of sodium in the associated soil samples are qualified as estimated (J) values.

3.1.7 Field Duplicate Results

One blind field duplicated soil sample, designated as 18-20-98-BIL-TP9-SS-01 to avoid detection by the laboratory, was collected concurrently with project soil sample 18-20-98-BIL-TP5-SS-01. The duplicate field sample was submitted for the same set of analyses conducted on the associated project sample. Table 2 provides a summary of the field duplicate sample results and associated RPDs by analytical method. No semi-volatile compounds, organochlorine pesticides and PCBs, or chlorinated herbicide compounds were detected in either the project soil sample or associated field duplicate sample (refer to Figure 2). No RPDs were calculated for compounds that were detected below five times the associated laboratory reporting limit. The RPD values calculated for VOCs included toluene at 19.4 percent and 1,2,4-trimethylbenzene at 106 percent. The RPDs calculated for total petroleum hydrocarbons ranged from 11.7 percent for diesel range hydrocarbons and 43.4 percent for lube oil range hydrocarbons. The RPDs for metals in soil ranged from 3.5 percent for magnesium to 71.8 percent for mercury, with an average RPD of 21.8 percent for all metals. No qualification of the associated sample data was deemed necessary based on review of the field duplicate results.

3.1.8 System Monitoring Compounds (Surrogate Recoveries)

The surrogate recoveries associated with the organic analyses conducted on project soil samples were within method-specified control limits, with the exception of the following:

- ***Volatile Organic Compounds***-- Two surrogate compounds, 2-bromopropene and 4-BFB are observed slightly below the established control limit in sample 8-19-98-BIL-TP1-SS-01. No VOC compounds were detected at or above the laboratory reporting limit. However, the non-detected results for sample 8-19-98-BIL-TP1-SS-01 are qualified as estimated (UJ) values base on the low surrogate recoveries which may result in a low bias result for this sample.
- ***Semi-volatile Compounds***-- One of six surrogate spike compounds, including phenol-d6 was detected below the established control limit in sample 8-20-98-BIL-TP6-SS-01. No qualification of the associated sample data is required based on this review.

Two acid fraction surrogate compounds, including 2-FP and phenol-d6 were detected below the established control limit in sample 8-20-98-BIL-TP7-SS-01. Both surrogates were detected at less than 10 percent recovery, which could indicate a low bias result for this sample. Although the loss of acid fraction surrogates is the suspected result of sample dilution, all acid fraction compounds positively detected for this sample are qualified as estimated (J) values. All non-detected acid fraction compounds are also qualified as estimates (UJ) based specifically on the very low acid fraction surrogate recoveries in this sample.

- ***Organochlorine pesticides and PCBs***-- The upper control limit of surrogate spike compound TCX was slightly exceeded in sample 8-19-98-BIL-TP4-SS-01. No qualification of the associated sample data is required based on this review.

The surrogate compound TCX was not recovered in four project soil samples, samples 8-20-89-BIL-TP5-SS-01, 8-20-89-BIL-TP6-SS-01, 8-20-89-BIL-TP7-SS-01, and 8-20-89-BIL-TP9-SS-01. The practical quantitation limit for these samples were reportedly raised based on sample dilution to account for matrix interference. Both positive and non-detected results for these samples are qualified as estimated (i.e., J and UJ, respectively) values based on the loss of the surrogate spike and the potential for low biased results in these samples.

- ***Herbicides***-- The surrogate recovery control limits for project soil samples were met. However, the reporting limits for two compounds, including dinoseb and dalapon were raised in all samples due to sample cleanup and dilution. The reporting limit for dinoseb was reportedly raised to account for matrix interference and for dalapon due to interfering extraction background peaks. No qualification of associated sample data is required based on this review.

3.1.9 Practical Quantitation Limits

The practical quantitation limits, as specified in the project work plan for soil sample analyses (Tetra Tech 1998), were adhered to by the laboratory with the exception of several samples associated with semi-volatile organic compounds and organochlorine pesticides and PCBs analyses. For these analyses,

sample-specific dilutions were performed as necessary to address observed matrix effects and/or high analyte concentrations. No additional qualification of the associated sample data is deemed necessary based on this review.

3.1.10 Overall Assessment of Soil Data

Overall, the analytical results in Work Order B808411 meet the data quality objectives set forth in the project Work Plan (Tetra Tech 1998). The laboratory's performance was generally considered good. The non-homogeneous nature of the sample matrix and elevated concentrations of various organic compounds and inorganic elements detected in project soil samples contributed significantly to the variability observed in the QC criteria described above.

3.2 GROUNDWATER (Work Order No. B809089)

Laboratory Work Order No. B809089 comprises 4 groundwater samples, including one field QA sample (refer to Table 1). The following section provides a summary of the QC criteria review for project groundwater samples.

3.2.1 Holding Times

All analyses were performed within the applicable method-specified maximum holding times (EPA 1996). No qualification of associated sample data are required based on this review.

3.2.2 Method Blanks

No target analytes were detected in associated laboratory method blank samples during the analyses of project groundwater samples, with the exception of the following:

- ***Volatile Organic Compounds***-- Methylene chloride was detected in blank sample 0980188-BLK1 at a concentration of 5.07 micrograms per liter ($\mu\text{g/L}$). Methylene chloride is a common laboratory artifact and was detected in one of four groundwater samples submitted for VOC analysis, sample 090298-BIL-MW2-GW-01, at a

concentration of 5.24 $\mu\text{g/L}$. This sample result, as reported by the laboratory, should be qualified by elevating the quantitation limit to the concentration found in the sample and reported as non-detect.

- **Total Metals**-- Calcium was detected in laboratory method blank sample 0980557-BLK1 at a concentration of 0.44 micrograms per liter ($\mu\text{g/L}$). The concentration of calcium detected in project soil samples is greater than 10 times the concentration detected in the associated method blank and therefore no qualification of associated sample data is deemed necessary.

3.2.3 Field Blanks

One trip blank sample, designated by the laboratory as B809089-05, was submitted with project groundwater samples for VOCs analysis. Two VOC compounds were detected in the trip blank sample at relatively low concentration, including methylene chloride at a concentration of 7.91 $\mu\text{g/L}$ and carbon disulfide at a concentration of 2.29 $\mu\text{g/L}$. Methylene chloride was detected in an associated method blank sample and is considered a common laboratory artifact. Carbon disulfide was not detected in project groundwater samples. No qualification of the associated sample data is deemed necessary based this review.

3.2.4 Continuing Calibration

Continuing calibrations were performed at the required frequencies and compared to the correct initial calibration with the following exceptions:

- **Organochlorine Pesticides and PCBs**-- The continuing calibrations bracketing project groundwater samples (i.e., QA Batch No. 0980213) were outside of the established acceptance criteria for 4,4'-DDT, heptachlor, endrin, endosulfan sulfate, 4,4'-DDD, and methoxychlor. These responses were above the upper control limit resulting in a potential high bias for positive sample results. The initial groundwater sample results were non-detect for all compounds. The laboratory reanalyzed the groundwater samples (i.e., within method-specified holding times) on 14 October 1998 with results matching the previous analysis. No organochlorine pesticide or PCB compounds were

detected in project groundwater samples, and no qualification of the associated sample data is deemed necessary based on this review.

3.2.5 Matrix Spike/Matrix Spike Duplicate Results

The MS/MSD results for project groundwater samples were found to be within the laboratory-specified percent recovery and RPD control limits, with the exception of the following:

- ***Volatile Organic Compounds--*** The percent recovery for 1,1-Dichloroethene and benzene is identified below the associated lower matrix spike recovery control limit for QA Batch 0980188. The laboratory indicated that 1,1-Dichloroethene and benzene were diminished in the analytical spiking standard due to volatilization, and that the recovery for these analytes does not represent an out-of-control condition for the sample batch. Based on review of associated batch QC results no qualification of the associated sample data is deemed necessary.
- ***Total Metals--*** MS/MSD percent recoveries and RPDs were outside established control limits for calcium and iron in QA Batch 0980557 due to the high concentrations of these metals in the spiked sample 090298-BIL-MW5-GW-01. No qualification of the associated sample data is deemed necessary based on this review.
- ***Organochlorine Pesticides and PCBs--*** MS/MSD percent recoveries and RPDs were slightly outside established control limits for aldrin and heptachlor in QA Batch 0980180. No associated compounds were detected in project groundwater samples and no qualification of the associated sample data is deemed necessary based on this review.

3.2.6 Laboratory Duplicate and Control Sample Results

Laboratory duplicate results were within specified RPD control limits and LCS results were within laboratory-specified percent recovery limits for all groundwater sample analyses, with the exception of the following:

- **Total Metals**-- The metal calcium was recovered slightly above the associated LCS percent recovery upper control limit for QA Batch 0980557 because of suspected laboratory contamination. Based on the LCS upper control limit exceedance and the potential for a high bias result, all positive detection of calcium in associated groundwater samples are qualified as estimated (J) values.

3.2.7 Field Duplicate Results

One blind field duplicated groundwater sample, designated as 090198-BIL-MW5-GW-01 to avoid detection by the laboratory, was collected concurrently with project groundwater sample 090198-BIL-MW4-GW-01. The duplicate field sample was submitted for the same set of analyses conducted on the associated project sample. Table 3 provides a summary of the groundwater field duplicate sample results and associated RPDs by analytical method. No semi-volatile compounds, organochlorine pesticides and PCBs, chlorinated herbicide compounds, or cyanide were detected in either the project groundwater sample or associated field duplicate sample (refer to Figure 3). A single VOC compound, including toluene at relatively low concentration of 1.11 $\mu\text{g/L}$ was detected in sample 090198-BIL-MW4-GW-01 but was not detected in the associated duplicate sample. The single detection of toluene was noted by the laboratory as a potential laboratory artifact. The RPD calculated for diesel range hydrocarbons was 2.4 percent. The RPDs for metals in groundwater ranged from 0.4 percent for calcium and zinc to 21.3 percent for iron, with an average RPD of 6.1 percent for all metals. No qualification of the associated sample data was deemed necessary based on review of the field duplicate results.

3.2.8 System Monitoring Compounds (Surrogate Recoveries)

The surrogate recoveries associated with the organic analyses conducted on project groundwater samples were within method-specified control limits. No qualification of the associated sample data is required.

3.2.9 Practical Quantitation Limits

The method-specific practical quantitation limits reported by the laboratory for all groundwater analyses are consistent with those specified in the project Work Plan (Tetra Tech 1998).

3.2.10 Overall Assessment of Groundwater Data

Overall, the analytical results in Work Order B809089 meet the data quality objectives set forth in the project Work Plan (Tetra Tech 1998) with good laboratory performance.

4.0 REFERENCES

EPA 1996. *Test Methods for Evaluating Solid Waste*. Office of Solid Waste and Emergency Response. SW-846. Third edition and updates. December, 1996.

Tetra Tech 1998. *Final Work Plan, Bradford Island Landfill Site Inspection, Cascade Locks, Oregon*. Prepared for the U.S. Army Corps of Engineers, Portland District. Contract No.: DACW57-96-D-0009. Task Order No.: 10. January 1998.

U.S. Environmental Protection Agency (EPA) 1994. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Office of Solid Waste and Emergency Response. Document number EPA-540/R-94-013. February 1994.

APPENDIX J

LANDFILL VOLUME ESTIMATES

FORMER BRADFORD ISLAND LANDFILL
VOLUME ESTIMATE

The following estimates of the lateral extent and volume of materials present within the Bradford Island landfill are based on the areas depicted on Figures J1 and J2.

Estimate of Lateral Extent

$$50 \text{ ft} \times 50 \text{ ft} = 2,500 \text{ ft}^2$$

$$25 \text{ ft} \times 75 \text{ ft} = 1,875 \text{ ft}^2$$

$$75 \text{ ft} \times 100 \text{ ft} = 7,500 \text{ ft}^2$$

$$75 \text{ ft} \times 125 \text{ ft} = 9,375 \text{ ft}^2$$

$$= 21,250 \text{ ft}^2$$

$$\times \frac{2.296 \times 10^{-5} \text{ acres}}{\text{ft}^2}$$

$$= 0.4879 \text{ acres}$$

Volume Estimate

$$25 \text{ ft} \times 50 \text{ ft} \times 8 \text{ ft} = 10,000 \text{ ft}^3$$

$$25 \text{ ft} \times 75 \text{ ft} \times 14 \text{ ft} = 26,250 \text{ ft}^3$$

$$50 \text{ ft} \times 100 \text{ ft} \times 16 \text{ ft} = 80,000 \text{ ft}^3$$

$$25 \text{ ft} \times 125 \text{ ft} \times 12 \text{ ft} = 37,500 \text{ ft}^3$$

$$25 \text{ ft} \times 125 \text{ ft} \times 10 \text{ ft} = 31,250 \text{ ft}^3$$

$$25 \text{ ft} \times 125 \text{ ft} \times 8 \text{ ft} = 25,000 \text{ ft}^3$$

$$25 \text{ ft} \times 100 \text{ ft} \times 8 \text{ ft} = 20,000 \text{ ft}^3$$

$$25 \text{ ft} \times 50 \text{ ft} \times 6 \text{ ft} = 7,500 \text{ ft}^3$$

$$= \frac{237,500 \text{ ft}^3}{27 \text{ ft}^3/\text{yd}^3}$$

$$= 8796.30 \text{ yd}^3$$



COLUMBIA
RIVER

● MW1

A

● TP2-SS-01

TP7-SS-01



TP1-SS-01



TP5-SS-01



● MW4

TP6-SS-02



TP4-SS-01

TP6-SS-01



● MW3

BK-1

MW2

● PW-1

TP8-SS-01



B

B'

ESTIMATED AERIAL EXTENT OF LANDFILL

AREA USED TO CALCULATE VOLUME ESTIMATES

0' 15' 30'
SCALE IN FEET

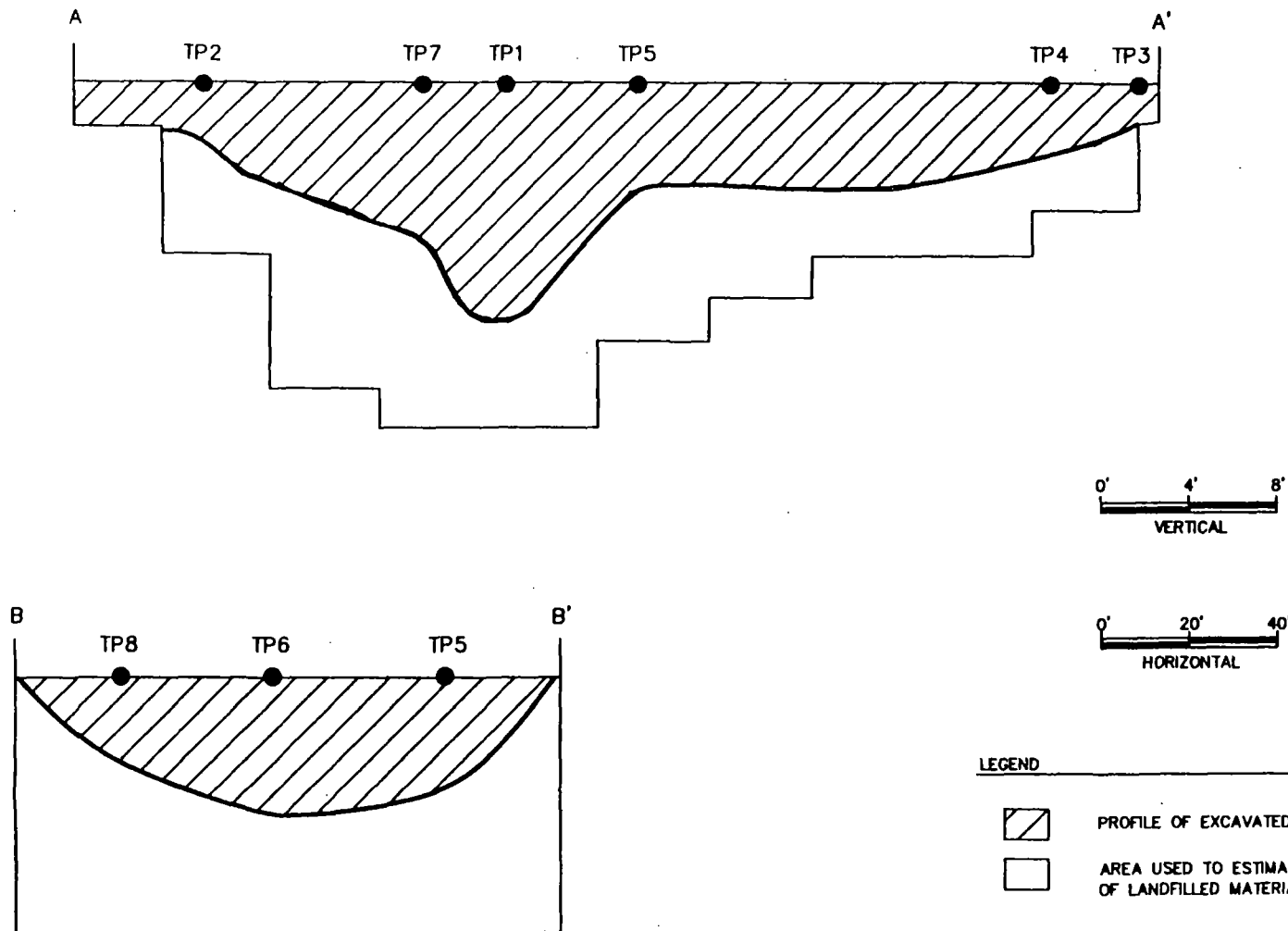
FORMER BRADFORD ISLAND LANDFILL SITE
CASCADE LOCKS, OREGON

FIGURE J1

AERIAL EXTENT OF LANDFILL



TETRA TECH



LEGEND



PROFILE OF EXCAVATED AREAS



AREA USED TO ESTIMATE VERTICAL EXTENT
OF LANDFILLED MATERIALS

FORMER BRADFORD ISLAND LANDFILL SITE
CASCADE LOCKS, OREGON

FIGURE J2

LANDFILL VOLUME ESTIMATE VERTICAL EXTENT



TETRA TECH